

## **Appendix G: Stormwater Management Supporting Documentation**

# STORMWATER MANAGEMENT REPORT

## SUFFOLK DOWNS REDEVELOPMENT PHASE 1

**Boston, MA**

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TABLE OF CONTENTS

1.0 INTRODUCTION.....2

2.0 PRE-DEVELOPMENT CONDITIONS.....3

2.1 SITE CONDITIONS .....3

2.1.1 Critical Areas.....4

2.1.2 Total Maximum Daily Loads .....4

2.2 SOIL DESCRIPTION .....5

2.3 HYDROLOGIC ANALYSIS .....5

3.0 POST-DEVELOPMENT CONDITIONS .....6

3.1 DESIGN STRATEGY.....6

3.2 HYDROLOGIC ANALYSIS .....6

3.3 COMPLIANCE WITH MASSDEP STORMWATER MANAGEMENT STANDARDS.....7

3.5 DEP’S CHECKLIST FOR A STORMWATER REPORT .....11

LIST OF APPENDICES

APPENDIX A: SOIL DATA

APPENDIX B: PRE-DEVELOPMENT HYDROLOGIC ANALYSIS

APPENDIX C: POST-DEVELOPMENT HYDROLOGIC ANALYSIS

APPENDIX D: TSS REMOVAL, WATER QUALITY, AND RECHARGE CALCULATIONS

APPENDIX E: SITE OWNER’S MANUAL

APPENDIX F: STORMWATER POLLUTION PREVENTION PLAN

## 1.0 INTRODUCTION

The proposed Phase 1 Project includes a stormwater management system designed to mitigate potential impacts to the existing watershed from the proposed project. Stormwater management measures are proposed to control peak runoff rates, provide water quality treatment, promote groundwater recharge, and promote sediment removal. The stormwater management system has been designed to comply with:

- The 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Handbook,
- The Massachusetts Wetland Protection Act Regulations (310 CMR 10.00),
- The Boston Water and Sewer Commission Stormwater Requirements;

The Phase 1 Project Site currently discharges to Land Subject to Coastal Storm Flowage (LSCSF) and ultimately to the Atlantic Ocean. The MassDEP Stormwater Management Handbook waives the requirement to mitigate peak stormwater discharge rates for projects that discharge to LSCSF, however Sales Creek is isolated from tidal flows by the Bennington Street tide gates and Department of Conservation and Recreation (DCR) pumping station. To demonstrate that the Phase 1 Project will not increase stormwater flows to the pumping station, the pre- and post-development hydrologic conditions were modeled using HydroCAD™ software. The hydrologic model shows that post-development stormwater runoff rates will be less than or equal to the pre-development rates.

To account for increased storm intensity projected to occur due to climate change, the 10-year and 100-year storm events used in the design of the proposed stormwater management system are based on the Boston Water and Sewer Commission's (BWSC) increased rainfall recommendations of 6.00 inches and 8.78 inches, respectively.

The following table summarizes the peak runoff rates for the pre- and post-development conditions.

	2 Year		10 Year		100 Year	
	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>
Design Point 2	7.32	5.60	21.68	16.60	37.03	28.34
Design Point 2A	40.65	35.32	93.12	89.09	144.92	143.74
Design Point 2C	20.44	19.13	57.28	53.63	95.90	89.78

Note: A design change has increased impervious area to Design Point 2C by approximately 0.50 acres to enable the existing on-site access drive parallel to Waldemar Avenue to loop into the proposed on-site drive. This change is not anticipated to have a material impact on the drainage design and the calculations will be revised to reflect the final site plan.

## **2.0 PRE-DEVELOPMENT CONDITIONS**

### **2.1 Site Conditions**

Suffolk Downs was constructed in the early 1930s by filling marshlands and tidal creeks. At that time, the majority of the existing on-site stormwater management system was built and the portion of Sales Creek that passes through the Project Site was reconstructed as a drainage channel. This occurred prior to the promulgation of MassDEP Stormwater Management Standards; therefore the existing stormwater management infrastructure provides negligible stormwater quality treatment. The existing system primarily consists of catch basins, drain pipes, stormwater outfalls and conveyance channels. Drainage channels that surround the infield racetrack capture runoff from the racetrack and discharge it to the infield pond or Sales Creek.

Improvements have been made to the system over time. Between 2003 and 2005 in conjunction with the development of the shopping plaza to the west, the drainage system from Tomasello Road and select parking lots on the Project Site were redirected to the stormwater basin located off-site to the west of the Project Site.

In 2012 further improvements were made to treat runoff from the barn and stable areas, which are classified as a Concentrated Animal Feeding Operation (CAFO) pursuant to the Clean Water Act. These improvements ensure that pollutants from the CAFO do not enter Sales Creek. The work included: conveying all stormwater runoff from the CAFO to a process water holding pond, where it is then pumped to the BWSC sanitary sewer system during dry weather, installing four sand filters to treat the runoff from the racetrack, installing a dedicated roof runoff collection system for the stable barns, and installing infiltration islands.

The Phase 1 Project Site drains to two primary locations on-site. The track area and infield drain to the pond located within the infield. The race track and infield areas drain to the pond located within the infield (the “infield pond”). The infield pond is approximately a 1-acre human-made feature constructed for ornamental purposes prior to 1938. A number of drainage channels direct runoff from the track to the pond. The level of the pond is regulated by a water control structure at the northern edge of the pond which artificially controls the mean annual flood level of the pond. Overflow from the pond drains to Sales Creek via an 18-inch culvert.

The existing overflow parking area and area outside of the track drain to the intermittent stream located along the eastern perimeter of the Project Site (H-series flags). the intermittent stream also drains to Sales Creek.

Sales Creek discharges to Belle Isle Marsh and ultimately Boston Harbor. Sales Creek is isolated from tidal flows by the Bennington Street tide gates and a stormwater pumping station that is owned and operated by the Department of Conservation and Recreation (DCR). During lower tides, Sales Creek flows directly via gravity to Belle Isle Inlet via

culverts under Bennington Street. During higher tides, when the tide gates are closed, flow in Sales Creek may be pumped to Belle Isle Inlet by the Bennington Street stormwater pumping station to mitigate high water levels in Sales Creek.

### **2.1.1 Critical Areas**

Critical Areas as defined by Standard 6 of the 2008 MassDEP Stormwater Management Handbook are areas where high levels of stormwater treatment is required; typically the first inch of runoff is treated using specific best management practices (BMPs) and pre-treatment methods. Specific source control and pollution prevention measures are also required.

The Massachusetts Surface Water Quality Standards (314 CMR 4.00) list both Sales Creek and the H-series intermittent stream as Class SA Outstanding Resource Waters (ORW). Pursuant to the Surface Water Quality Standards, these waters are designated as an excellent habitat for fish, other aquatic life, and wildlife and shall have an excellent aesthetic value.

Belle Isle Marsh consists of approximately 241-acres and is part of the larger Rumney Marsh Area of Critical Environmental Concern (ACEC). Belle Isle Marsh is designated as a shellfish growing area by the Division of Marine Fisheries but is currently listed as an area where shellfish growing is prohibited.

Both ORWs and shellfish growing areas are classified as critical areas.

### **2.1.2 Total Maximum Daily Loads**

MassDEP has issued a draft Pathogen Total Maximum Daily Load (TMDL) for the Boston Harbor Watershed (excluding the Neponset River sub-basin). A TMDL is the greatest amount of a pollutant that a waterbody can accept and still meet water quality standards for protecting public health and maintaining the designated beneficial uses of those waters for drinking, swimming, recreation, and fishing. A TMDL is implemented by specifying how much of that pollutant can come from point, nonpoint, and natural sources. Urban runoff, combined sewer overflows, sewer overflows and heavy industrial activity have impaired Boston Harbor. Known pollutants include, but are not limited to, fecal coliform, e. coli, phosphorus, and total suspended solids.

## 2.2 Soil Description

The Natural Resources Conservation Service (NRCS) Web Soil Survey indicates that the soils within the racetrack consist of Udorthents with wet substratum. These soils are located in areas that were previously tidal marshes, river floodplains, bays, harbors, and swamps. The fill consists of rubble, refuse, and mixed soil material, typically, sand, gravel, and channel dredgings. The parking area are listed as Urban land with wet substratum. These soils consist of developed areas within Udorthents, wet substratum. No hydrologic soil class is assigned to these soil types, but permeability is typically low.

Small areas of Newport silt loam line the southern boundary of the Phase 1 Project Site. This is a deep, well-drained soil with moderate permeability, and typically shallow groundwater. It is classified as hydrologic soil class B. The soils along the eastern boundary of the Phase 1 Project Site consist of Ipswich mucky peat, which is a very poorly drained, nearly level soil in tidal marshes. It is listed as hydrologic soil class A/D.

Test pits performed on the Project Site in 2012 by Haley and Aldrich, Inc., indicated consistent material generally throughout the Project Site, consisting of fill. The top 24-inches of soil are classified as either poorly graded sand or silty sand. Below 24-inches the soil is mostly unclassified fill, poorly graded sand, silty sand, or clayey sand. Groundwater was found on average 2 to 7-feet below existing grade.

## 2.3 Hydrologic Analysis

Sub-catchment areas were delineated based on existing runoff patterns and topographic information. This information is shown on the *Pre-Development Conditions Hydrologic Areas Map* included in Appendix B. Summaries of each area with respect to Curve Number and Time of Concentration calculations can be found in the model results also in Appendix B.

To account for the increased storm intensity projected to occur due to climate change rainfall depths used in the hydrologic model were based on a presentation entitled “BWSC Climate Change Risk Assessment, Findings and Mitigation/Adaptation Strategies for Wastewater and Storm Drainage”, dated January 28, 2015 and prepared by Boston Water and Sewer Commission. The 10-year and 100-year storm events were modeled with a total depth of 6.00 inches and 8.78 inches, respectively.

### 3.0 **POST-DEVELOPMENT CONDITIONS**

#### 3.1 **Design Strategy**

During the design phase of the site layout, consideration was given to conserving environmentally sensitive features and minimizing impact on the existing hydrology. On-site resource areas, such as those associated with the intermittent stream and infield pond, will not be altered by the proposed project.

A stormwater management system has been designed to provide treatment for stormwater runoff associated with the proposed impervious surfaces on site. All stormwater BMPs were designed to treat a minimum of the first 1.0 inch of runoff generated by the on-site impervious areas. Proprietary stormwater treatment systems were designed to treat the runoff rate associated with the water quality volume in accordance with the requirements of the MassDEP Stormwater Handbook.

To mitigate increased stormwater flow rates associated with the proposed impervious area, two infiltration basins have been proposed. The bottom of infiltration basin 1 has been set at elevation 14.5. Based on soil borings within this area groundwater is assumed to be at elevation 12.0 approximately. The bottom of infiltration basin 2 is set at elevation 16.0. Groundwater is assumed to be at elevation 10.0 in this area.

Both infiltration basins were sized using the Simply Dynamic Method, as described in Chapter 3 of the Massachusetts Stormwater Handbook. The system has been designed to meet the required recharge volume, and will fully dewater within 72 hours.

#### 3.2 **Hydrologic Analysis**

The established design points used in the pre-development conditions analysis were used in the post-development analysis for direct comparison. The tributary areas and flow paths were modified to reflect post-development conditions. See Appendix C for the *Post- Development Conditions Hydrologic Areas Map*. Summaries of each area with respect to Curve Number and Time of Concentration calculations can be found in the model results in Appendix C.



### 3.3 Compliance with MassDEP Stormwater Management Standards

The proposed stormwater management system was designed in compliance with the ten (10) DEP Stormwater Management Standards. The following summary provides key information related to the proposed stormwater management system, its design elements, and mitigation measures for potential impacts.

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**STANDARD 1:**      **No new stormwater conveyance (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.**

There will be no direct discharge of untreated stormwater to nearby wetlands or waters of the Commonwealth. Runoff from all impervious areas of the Phase 1 Project Site will be conveyed to stormwater management controls for water quality treatment and runoff rate attenuation prior to discharge to adjacent streams and wetlands.

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**STANDARD 2:**      **Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.**

As previously discussed, the Phase 1 Project will control post-development peak discharge rates for the 2-, 10-, and 100-year, 24-hour storms so as to maintain pre-development peak discharge rates.

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**STANDARD 3:**      **Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater management practices and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil types. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.**

The stormwater management system includes two infiltration basins that will effectively recharge groundwater on-site. Infiltration BMPs were sized using the simple dynamic method based on the required recharge volume for the post-development site. As a result, annual

recharge from the post-development site will approximate the annual recharge from the site under pre-development conditions. See Appendix D for stormwater BMP design worksheets and Groundwater Recharge Calculation.

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**STANDARD 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).**

The proposed Phase 1 Project will be designed to meet the water quality requirements of Standard 4 using on-site treatment trains that achieve 80% TSS removal. Structural BMPs designed for water quality treatment, including deep sump hooded catch basins, water quality treatment systems, and infiltration basins will be sized to capture and treat the flow rate associated with the first 1.0-inch of runoff from the proposed impervious surfaces. All proposed stormwater management BMPs will be operated and maintained to ensure continued water quality treatment of runoff. A Site Owner's Manual that complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 MassDEP Stormwater Management Standards will be developed. The Manual will outline the source control and pollution prevention measures and maintenance requirements of the stormwater BMPs associated with the proposed development.

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**STANDARD 5: For land uses with higher potential pollutant loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.**

The Phase 1 Project includes a parking lot with high intensity use. The primary parking for the Project will be located within the building. Runoff from the interior spaces will be collected by and oil water separator designed in accordance with the plumbing code prior to discharging to the sewer system.

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**STANDARD 6: Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas. Critical areas are Outstanding Resource Waters, shellfish beds, swimming beaches, coldwater fisheries and recharge areas for public water supplies.**

The proposed BMPs will be consistent with the MassDEP Stormwater Management Handbook for discharges within critical areas. The stormwater management system will be designed to capture and treat the first 1.0-inch of runoff as stipulated in the MassDEP Stormwater

Management Handbook. Deep sump hooded catch basins and water quality treatment systems are proposed to remove pollutants from the first 1.0-inch of runoff from all new impervious areas. Adequate pretreatment will be provided before discharge.

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**STANDARD 7:**        **Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.**

The Project is a mix of new development and redevelopment. All new impervious areas will be designed to fully comply with all standards of the Stormwater Management Handbook.

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**STANDARD 8:**        **A plan to control construction-related impacts during erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.**

A Stormwater Pollution Prevention Plan (SWPPP) will be developed to comply with Section 3 of the NPDES Construction General Permit for Stormwater Discharges; therefore the requirements of Standard 8 will be fulfilled.

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**STANDARD 9:**        **A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.**

The Site Owner's Manual complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards. The Manual outlines source control and pollution prevention measures and maintenance requirements of the stormwater best management practices (BMPs) associated with the proposed development.

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**STANDARD 10:**       **All illicit discharges to the stormwater management system are prohibited.**

There will be no illicit discharges to the proposed stormwater management system associated with the proposed Phase 1 Project. An Illicit Discharge Compliance Statement will be provided

in the final Stormwater Report included in the required Notice of Intent Application to the City of Boston Conservation Commission.



# Checklist for Stormwater Report

## A. Introduction

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.<sup>1</sup> This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8<sup>2</sup>
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

<sup>1</sup> The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

<sup>2</sup> For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



# Checklist for Stormwater Report

## B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

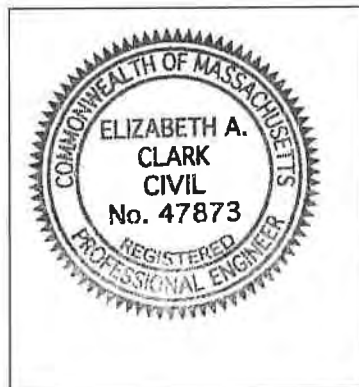
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

### Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



*Elizabeth A. Clark*  
Signature and Date

## Checklist

**Project Type:** Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New development
- ☐ Redevelopment
- ☒ Mix of New Development and Redevelopment



# Checklist for Stormwater Report

## Checklist (continued)

**LID Measures:** Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): \_\_\_\_\_

## Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

### Standard 3: Recharge

- ☐ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - ☐ Static
  - ☒ Simple Dynamic
  - ☐ Dynamic Field<sup>1</sup>
- ☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
  - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
  - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

<sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.





# Checklist for Stormwater Report

## Checklist (continued)

### Standard 3: Recharge (continued)

- ☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

### Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
  - Provisions for storing materials and waste products inside or under cover;
  - Vehicle washing controls;
  - Requirements for routine inspections and maintenance of stormwater BMPs;
  - Spill prevention and response plans;
  - Provisions for maintenance of lawns, gardens, and other landscaped areas;
  - Requirements for storage and use of fertilizers, herbicides, and pesticides;
  - Pet waste management provisions;
  - Provisions for operation and management of septic systems;
  - Provisions for solid waste management;
  - Snow disposal and plowing plans relative to Wetland Resource Areas;
  - Winter Road Salt and/or Sand Use and Storage restrictions;
  - Street sweeping schedules;
  - Provisions for prevention of illicit discharges to the stormwater management system;
  - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
  - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
  - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
  - ☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
    - ☐ is within the Zone II or Interim Wellhead Protection Area
    - ☒ is near or to other critical areas
    - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
    - ☒ involves runoff from land uses with higher potential pollutant loads.
  - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
  - ☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
  - ☒ The ½" or 1" Water Quality Volume or
  - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☒ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

### Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted *prior* to the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does *not* cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has *not* been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

### Standard 6: Critical Areas

- ☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☒ Critical areas and BMPs are identified in the Stormwater Report.



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
  - ☐ Limited Project
  - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
  - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
  - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
  - ☐ Bike Path and/or Foot Path
  - ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
  - Construction Period Operation and Maintenance Plan;
  - Names of Persons or Entity Responsible for Plan Compliance;
  - Construction Period Pollution Prevention Measures;
  - Erosion and Sedimentation Control Plan Drawings;
  - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
  - Vegetation Planning;
  - Site Development Plan;
  - Construction Sequencing Plan;
  - Sequencing of Erosion and Sedimentation Controls;
  - Operation and Maintenance of Erosion and Sedimentation Controls;
  - Inspection Schedule;
  - Maintenance Schedule;
  - Inspection and Maintenance Log Form.
- ☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☒ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

### Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
  - ☒ Name of the stormwater management system owners;
  - ☒ Party responsible for operation and maintenance;
  - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
  - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
  - ☐ Description and delineation of public safety features;
  - ☐ Estimated operation and maintenance budget; and
  - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
  - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

### Standard 10: Prohibition of Illicit Discharges

- ☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☒ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

## **Appendix A**

### **Soil Data**


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Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts  
(Suffolk Downs Redevelopment Hydrologic Soil Group)









## MAP LEGEND

### Area of Interest (AOI)









 Area of Interest (AOI)

### Soils


#### Soil Rating Polygons





 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Lines

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Points






 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available

### Water Features

 Streams and Canals

### Transportation

 Rails  
 Interstate Highways  
 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts  
 Survey Area Data: Version 12, Sep 15, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—Aug 25, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Norfolk and Suffolk Counties, Massachusetts (MA616)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		9.0	1.4%
65	Ipswich mucky peat, 0 to 2 percent slopes, very frequently flooded	A/D	40.2	6.1%
325D	Newport silt loam, 15 to 25 percent slopes	B	64.9	9.9%
603	Urban land, wet substratum, 0 to 3 percent slopes		298.6	45.4%
610	Beaches		1.3	0.2%
627C	Newport-Urban land complex, 3 to 15 percent slopes	B	85.2	13.0%
653	Udorthents, sandy	A	2.0	0.3%
655	Udorthents, wet substratum		156.3	23.8%
Totals for Area of Interest			657.6	100.0%



## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

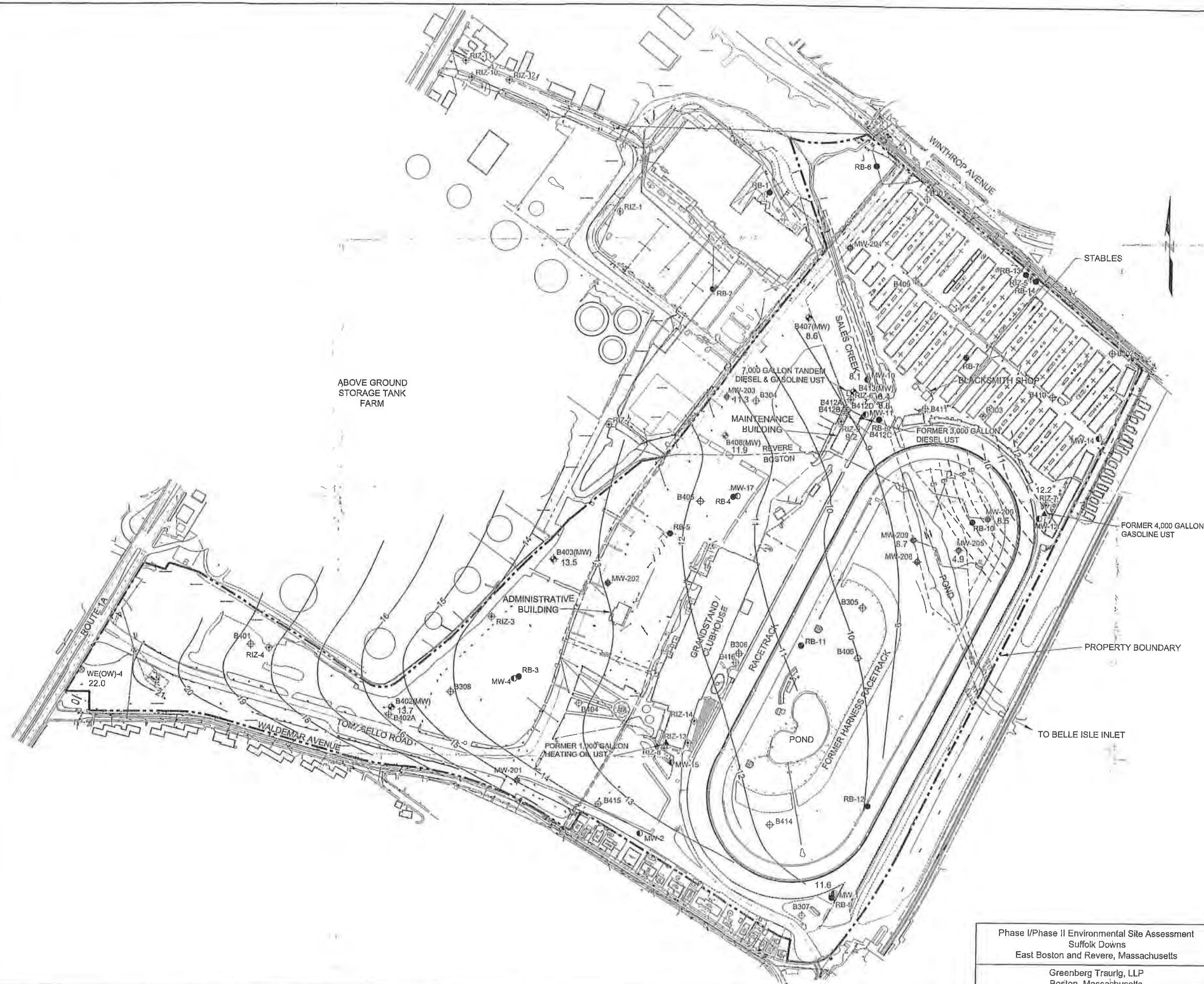
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

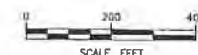


# **LEGEND:**

- 13.7 GROUNDWATER ELEVATION MEASURED BY GEI ON DECEMBER 27, 2006. ELEVATIONS ARE APPROXIMATE DUE TO INCONSISTENCIES BETWEEN SURVEY DATA AND REFERENCE ELEVATIONS.
- 13— ESTIMATED GROUNDWATER ELEVATION CONTOUR, DASHED WHERE INFERRED
- B-402(MW) MONITORING WELL INSTALLED BY GEI (2006)
- B-401 BORING INSTALLED BY GEI (2006)  
300 SERIES - GEOTECHNICAL  
400 SERIES - ENVIRONMENTAL
- RIZ-1 MONITORING WELL INSTALLED BY RIZZO (1996)
- RB-1 SOIL BORING INSTALLED BY RIZZO (1996)
- MW-201 MONITORING WELL INSTALLED BY GEI (1991)
- MW-1 MONITORING WELL INSTALLED BY GEI (1986)
- WE(OW)-4 WELL INSTALLED BY OTHERS
- CATCH BASIN
- CABLE TELEVISION MANHOLE
- DRAIN MANHOLE
- ELECTRIC MANHOLE
- MISCELLANEOUS MANHOLE
- SEWER MANHOLE
- TELEPHONE MANHOLE
- WATER MANHOLE
- FIRE HYDRANT
- UTILITY POLE
- LIGHT POLE
- CHAIN LINK FENCE
- UNDERGROUND CABLE TV LINE
- UNDERGROUND DRAIN LINE
- UNDERGROUND ELECTRIC LINE
- UNDERGROUND GAS LINE
- UNDERGROUND SEWER LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND WATER LINE

## **NOTES:**

1. FIGURE REPRODUCED FROM NITSCH ENGINEERING PROGRESS PRINT DATED 3/13/06.
2. ELEVATION DATUM IS BOSTON CITY BASE.
3. HISTORIC BORINGS, WELLS, AND UST LOCATIONS OBTAINED FROM RIZZO ASSOCIATES, INC. LOCATIONS ARE APPROXIMATE.
4. THE UTILITY INFORMATION SHOWN IS COMPILED BASED ON FIELD SURVEY INFORMATION AND RECORD INFORMATION. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM RECORD PLANS AND ARE APPROXIMATE ONLY.



Phase I/Phase II Environmental Site Assessment  
Suffolk Downs  
East Boston and Revere, Massachusetts  
  
Greenberg Traurig, LLP  
Boston, Massachusetts




GROUNDWATER  
ELEVATION CONTOURS  
DECEMBER 27, 2006

Project 06478-0

February 2007

Fig. 5

<b>BORING LOG</b>						<b>B414</b>		Page 1 of 1	
Client: Greenberg Traurig LLP			Boring Location: Suffolk Downs			Boring Method: Geoprobe			
Contractor: Geosearch			Ground Elevation (ft): NM			Core Barrel: NA			
Operator: R. Kaddy			Total Depth (ft): 20			Casing ID: NA			
Logged By: A. Ahles			Groundwater Depth (ft): 3.05			Sampler: 2" Macrocore			
Date Start to Finish: 12/22/06 - 12/22/06			Hammer Wt./Fall: NA						
<b>Abbreviations:</b> S = Split Spoon Sample    Pen. = Penetration length    RQD = Rock Quality Designation    S <sub>v</sub> = Pocket Torvane Shear Strength DP = Direct Push Sample    Rec. = Recovery Length    OVM = Organic Vapor Meter    Q <sub>p</sub> = Pocket Penetrometer Unconfined Compressive Strength U = Undisturbed Tube Sample    WOR = Weight Of Rods    NA, NM = Not Applicable, Not Measured C = Rock Core Sample    WOH = Weight Of Hammer									
Elevation (ft)	Depth (ft)	Sample Information				Layer	Descriptions	Remarks	
	0	Sample No.	Pen./Rec. (inches)	Sample Depth [Sample Elev.] (ft)	Blows per 6 in. or RQD (%)	Layer			
		S1	60/29	0.0 to 5.0	PUSH	TOPSOIL	Top 4" topsoil S1 (TOP 25"): WIDELY GRADED SAND WITH GRAVEL (SW): $\approx$ 80% fine to coarse sand; $\approx$ 20% fine gravel, max size 0.75" diameter; fill characteristics included brick and wood; moist S1 (BOT 4"): SANDY ORGANIC SOIL (OL/OH): $\approx$ 50% sand; organic; roots; wood pieces; organic odor; wet; black.	OVM = 0.0 OVM = 0.0	
	5	S2	60/14	5.0 to 10.0	PUSH	FILL	S2: SANDY ORGANIC SOIL (OL/OH): $\approx$ 60% sand; $\approx$ 20% gravel; $\approx$ 20% organic; fill characteristics included brick, wood, and ceramics; organic odor; wet; black.		
	10	S3	60/29	10.0 to 15.0	PUSH	FILL	S3 (TOP 10"): Similar to S2. S3 (BOT 19"): ORGANIC SOIL (OL/OH): Mostly non-plastic to low plasticity silt; seashells; wet; gray.	OVM = 0.0 OVM = 0.0	
	15	S4	60/34	15.0 to 20.0	PUSH	SAND	S4 (TOP 10"): Similar to S3 (BOT 19"). S4 (BOT 24"): NARROWLY GRADED SAND: Mostly fine sand; $\leq$ 5% silt; wet; gray.	OVM = 0.0 OVM = 0.0	
	20						BOTTOM OF BOREHOLE, 20.0 FEET		
	25								
	30								
<b>Notes:</b> Organic Vapor Meter (OVM) readings reported in parts per million (ppm)									
Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made. Stratification lines represent approximate boundaries between soil types; transitions may be gradual.						<b>Project:</b> Suffolk Downs  <b>GEI Proj. No.:</b> 064780 <b>Location:</b> East Boston/Revere, MA		 <b>GEI Consultants, Inc.</b> 400 Unicorn Park Drive Woburn, MA 01801	

I:\APPS\GEOSTR\BORINGS\2/12/2007

## **Appendix B**

### **Pre-Development Hydrologic Analysis**

---

<i>JOB NO./LOCATION:</i>	
2854.02 Boston/Revere, Massachusetts	
<i>CLIENT/PROJECT:</i>	
HYM Investments, LLC Suffolk Downs Redevelopment	
<i>SUBJECT/TITLE:</i>	
Existing Conditions Hydrologic Analysis Phase 1	
<i>OBJECTIVE OF CALCULATION:</i>	
<ul style="list-style-type: none"> <li>To determine the pre-development peak rates of runoff from the site for the 2, 10 and 100 year storm events</li> </ul>	
<i>CALCULATION METHOD(S):</i>	
<ul style="list-style-type: none"> <li>CN and Tc determined based on TR-55 methodology.</li> <li>Runoff rates computed using HydroCAD version 10.0</li> </ul>	
<i>ASSUMPTIONS:</i>	
<ul style="list-style-type: none"> <li>Surface cover types and boundaries have been estimated based upon MassGIS, USGS Color Ortho Imagery 2016, aerial photography viewed on Google Earth, and AutoCAD file 285402B004D.dwg</li> <li>Upgradient tributary area was based upon data obtained from the MassGIS Oliver program. Surface cover was based on aerial photography viewed on Google Earth.</li> <li>Wetland areas modeled as hydrologic soil class "D" soils. Urban Land, Udorthents, and Ipswich Mucky Peat Model as Hydrologic soil class "C" soils.</li> <li>Rainfall depth for 10-year storm event and 100-year storm event based on BWSC Climate Change Risk Assessment, Findings and Mitigation/Adaptation Strategies for Wastewater and Storm Drainage dated 01/28/2015.</li> </ul>	
<i>SOURCES OF DATA/EQUATIONS:</i>	
<ul style="list-style-type: none"> <li>Alta/NSPS Land Title Survey, Suffolk Downs, Boston/Revere, Massachusetts, prepared by Beals and Thomas, Inc., dated 05/23/17.</li> <li>Pre-Development Conditions Hydrologic Areas Map Phase 1, dated 11/30/2017 prepared by Beals and Thomas, Inc.</li> <li>TR-55 Urban Hydrology for Small Watersheds, SCS, 1986.</li> <li>NRCS Soil Survey for Middlesex Country downloaded from Web Soil Survey 2.0 on 05/04/2017.</li> </ul>	

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	<i>H. L. Evans</i>	<i>11/16/17</i>	<i>E. C. C.</i>	<i>11/16/17</i>	<i>E. C. C.</i>	<i>11/16/17</i>



# BEALS + THOMAS

BEALS AND THOMAS, INC.  
Reservoir Corporate Center  
144 Turnpike Road  
Southborough, MA 01772-2104

## CALCULATION SUMMARY

T 508.366.0560

F 508.366.4391

[www.bealsandthomas.com](http://www.bealsandthomas.com)

Regional Office: Plymouth, MA

### CONCLUSIONS:

The following numbers represent the peak rates of runoff from the site under existing conditions

#### Peak Rates of Runoff

Storm Event	Design Point 2 Sales Creek (cfs)	Design Point 2A Wetland South of the Track (cfs)	Design Point 2C Infield Pond (cfs)
<b>2-year</b>	7.32	40.65	20.44
<b>10-year</b>	21.68	93.12	57.28
<b>100-year</b>	37.03	144.92	95.90

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	<i>L. Ennis</i>	<i>11/16/17</i>	<i>E. Cech</i>	<i>11/16/17</i>	<i>E. Cech</i>	<i>11/16/17</i>

EAE/285400CS011



BEALS + THOMAS



EDA-2



6R

Design Point 2A,  
Wetland South of Track

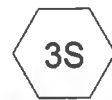


EDA-5



10R

Design Point 2C, Infield  
Pond

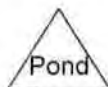
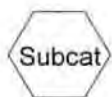


EDA-3A



8R

Design Point 2, Sales  
Creek



**Routing Diagram for 285400HC005 - Phase 1 Existing**  
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HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

**285400HC005 - Phase 1 Existing**

Prepared by {enter your company name here}

Printed 11/16/2017

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Page 2

**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
1.477	61	>75% Grass cover, Good, HSG B (2S)
23.839	74	>75% Grass cover, Good, HSG C (2S, 3S, 5S)
0.207	73	Brush, Good, HSG D (3S, 5S)
1.220	73	Brush, Good, HSG D (Wetland) (2S)
3.225	87	Dirt (5S)
1.989	87	Dirt track, HSG C (2S, 3S)
1.225	96	Gravel surface, HSG C (2S)
1.674	98	Paved parking, HSG B (2S)
7.927	98	Paved parking, HSG C (2S, 3S, 5S)
0.727	98	Roofs, HSG B (2S)
0.143	98	Roofs, HSG C (2S, 5S)
0.046	98	Water Surface, HSG B (2S)
1.348	98	Water Surface, HSG C (2S, 3S, 5S)



**285400HC005 - Phase 1 Existing**

Type III 24-hr BWSC-100yr Rainfall=8.78"

Prepared by {enter your company name here}

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Page 3

**Summary for Subcatchment 2S: EDA-2**

Runoff = 144.92 cfs @ 12.09 hrs, Volume= 11.115 af, Depth&gt; 7.21"

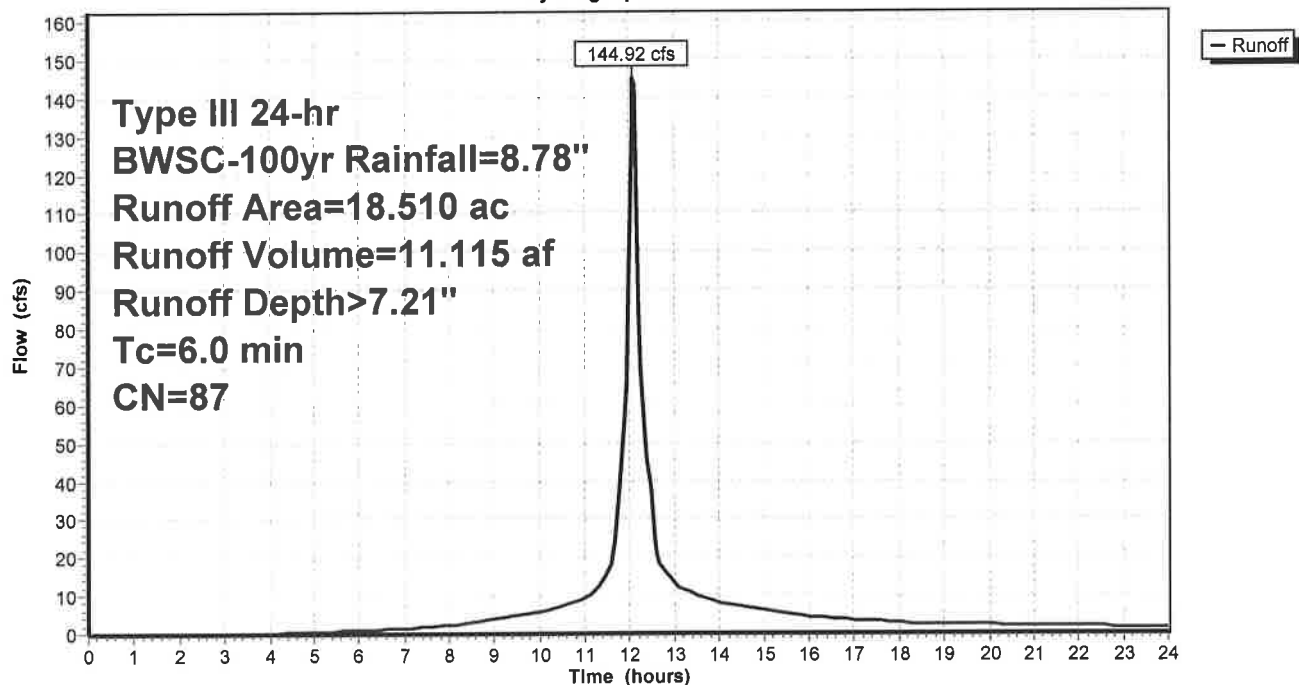
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr BWSC-100yr Rainfall=8.78"

Area (ac)	CN	Description
* 1.220	73	Brush, Good, HSG D (Wetland)
0.049	98	Roofs, HSG C
0.727	98	Roofs, HSG B
1.674	98	Paved parking, HSG B
7.387	98	Paved parking, HSG C
0.014	98	Water Surface, HSG C
4.388	74	>75% Grass cover, Good, HSG C
1.477	61	>75% Grass cover, Good, HSG B
1.225	96	Gravel surface, HSG C
0.046	98	Water Surface, HSG B
* 0.303	87	Dirt track, HSG C
18.510	87	Weighted Average
8.613		46.53% Pervious Area
9.897		53.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, direct entry

**Subcatchment 2S: EDA-2**

Hydrograph



**285400HC005 - Phase 1 Existing**

Type III 24-hr BWSC-100yr Rainfall=8.78"

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Page 4

**Summary for Subcatchment 3S: EDA-3A**

Runoff = 37.03 cfs @ 12.24 hrs, Volume= 3.720 af, Depth&gt; 5.98"

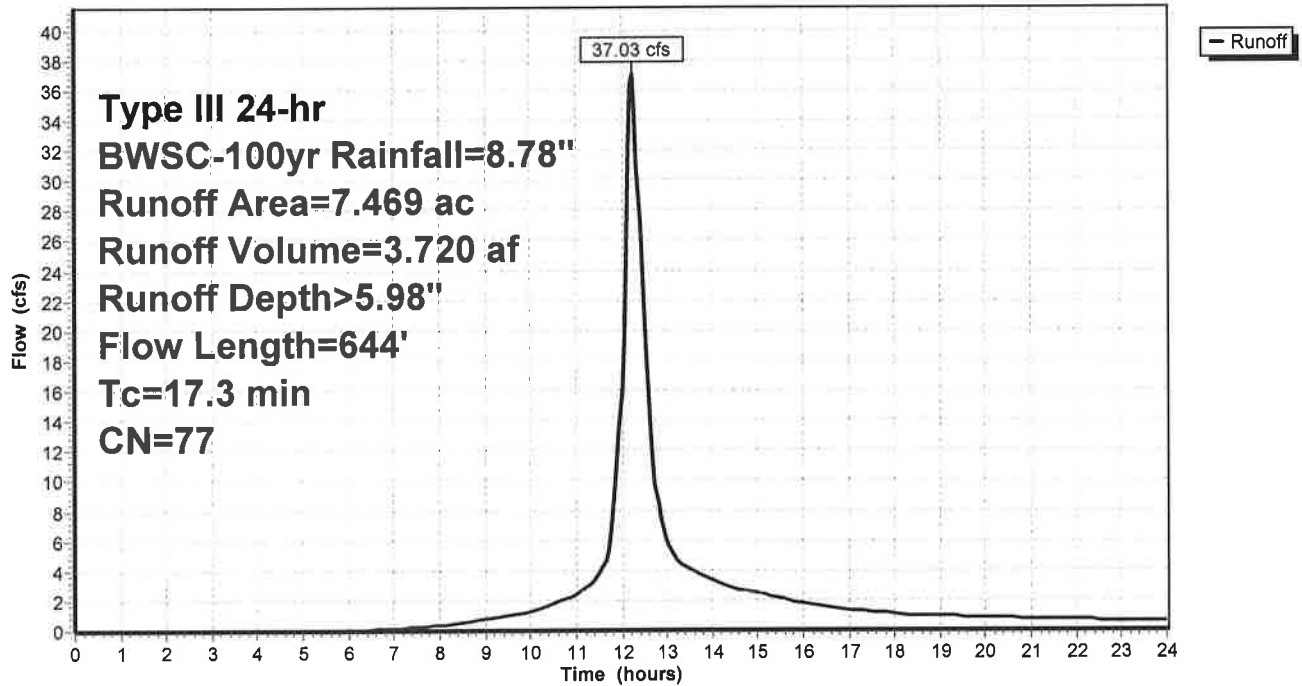
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr BWSC-100yr Rainfall=8.78"

Area (ac)	CN	Description
5.657	74	>75% Grass cover, Good, HSG C
* 1.686	87	Dirt track, HSG C
0.006	98	Paved parking, HSG C
0.062	73	Brush, Good, HSG D
0.058	98	Water Surface, HSG C
7.469	77	Weighted Average
7.405		99.14% Pervious Area
0.064		0.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	47	0.0217	0.15		<b>Sheet Flow, Grass</b> Grass: Short n= 0.150 P2= 3.20"
1.3	68	0.0150	0.86		<b>Shallow Concentrated Flow, Grass</b> Short Grass Pasture Kv= 7.0 fps
2.0	89	0.0110	0.73		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
1.0	55	0.0180	0.94		<b>Shallow Concentrated Flow, Grass</b> Short Grass Pasture Kv= 7.0 fps
0.7	46	0.0217	1.03		<b>Shallow Concentrated Flow, Grass</b> Short Grass Pasture Kv= 7.0 fps
1.6	75	0.0130	0.80		<b>Shallow Concentrated Flow, Grass</b> Short Grass Pasture Kv= 7.0 fps
1.3	65	0.0150	0.86		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
3.1	118	0.0080	0.63		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.9	52	0.0190	0.96		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.2	16	0.0625	1.75		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.0	13	0.3840	4.34		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
17.3	644	Total			

Subcatchment 3S: EDA-3A

Hydrograph



**285400HC005 - Phase 1 Existing**

Type III 24-hr BWSC-100yr Rainfall=8.78"

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Page 6

**Summary for Subcatchment 5S: EDA-5**

Runoff = 95.90 cfs @ 12.25 hrs, Volume= 9.883 af, Depth&gt; 6.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr BWSC-100yr Rainfall=8.78"

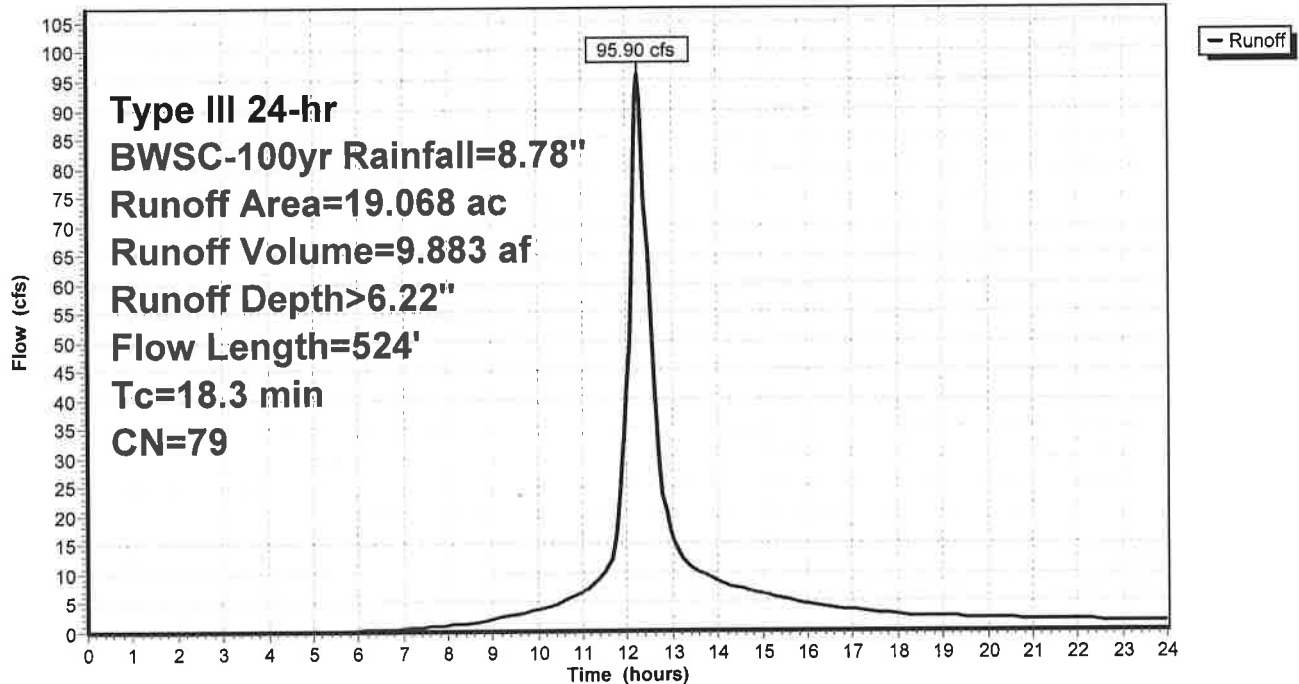
Area (ac)	CN	Description
1.276	98	Water Surface, HSG C
* 3.225	87	Dirt
13.794	74	>75% Grass cover, Good, HSG C
0.094	98	Roofs, HSG C
0.145	73	Brush, Good, HSG D
0.534	98	Paved parking, HSG C
19.068	79	Weighted Average
17.164		90.01% Pervious Area
1.904		9.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		<b>Sheet Flow, grass</b> Grass: Short n= 0.150 P2= 3.20"
1.1	60	0.0167	0.90		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
6.6	197	0.0050	0.49		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
3.9	136	0.0070	0.59		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.7	44	0.0227	1.05		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.0	7	0.1429	2.65		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.4	30	0.0333	1.28		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
18.3	524	Total			

**Subcatchment 5S: EDA-5**

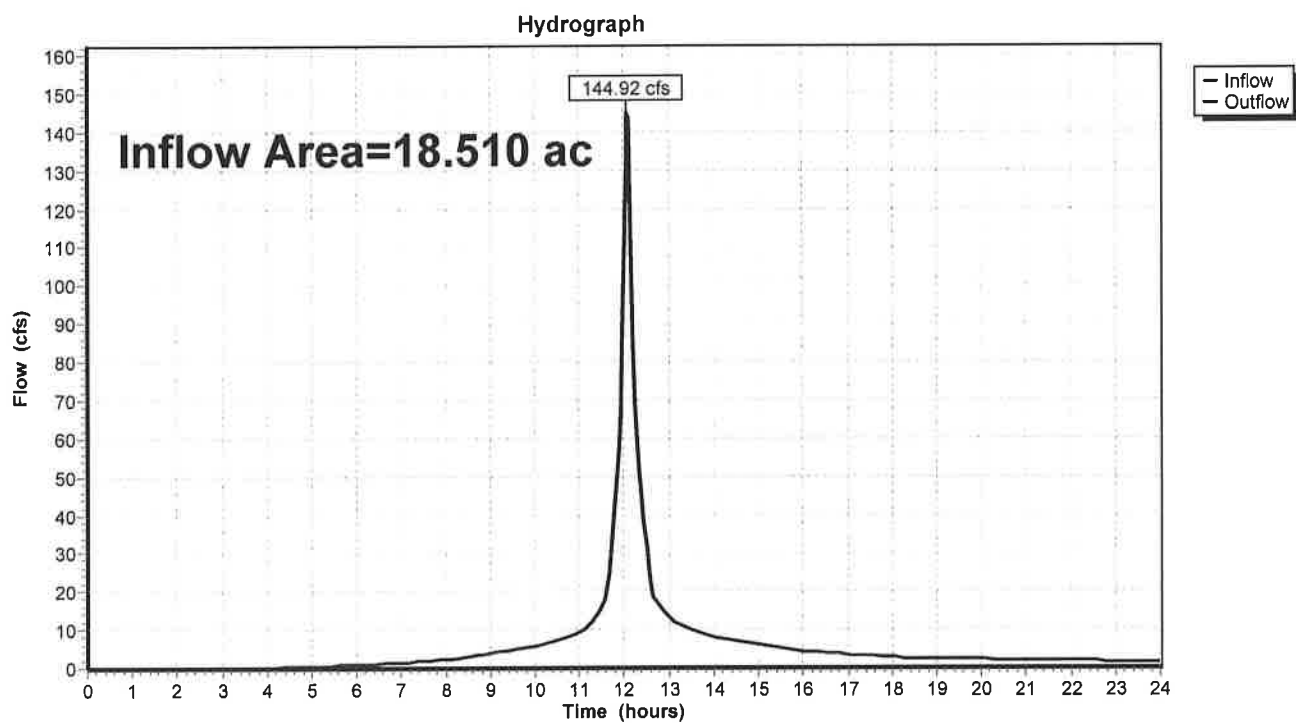
Hydrograph



**Summary for Reach 6R: Design Point 2A, Wetland South of Track**

Inflow Area = 18.510 ac, 53.47% Impervious, Inflow Depth > 7.21" for BWSC-100yr event  
Inflow = 144.92 cfs @ 12.09 hrs, Volume= 11.115 af  
Outflow = 144.92 cfs @ 12.09 hrs, Volume= 11.115 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

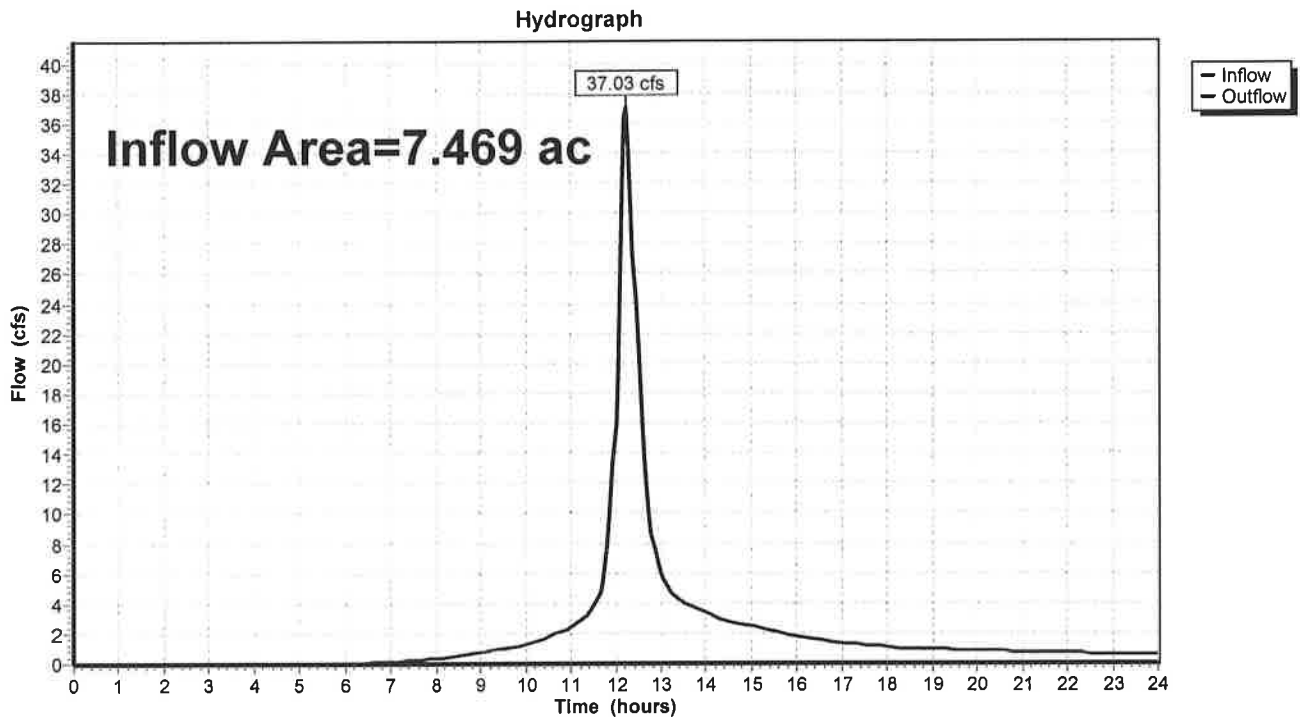
**Reach 6R: Design Point 2A, Wetland South of Track**

### Summary for Reach 8R: Design Point 2, Sales Creek

Inflow Area = 7.469 ac, 0.86% Impervious, Inflow Depth > 5.98" for BWSC-100yr event  
Inflow = 37.03 cfs @ 12.24 hrs, Volume= 3.720 af  
Outflow = 37.03 cfs @ 12.24 hrs, Volume= 3.720 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

### Reach 8R: Design Point 2, Sales Creek



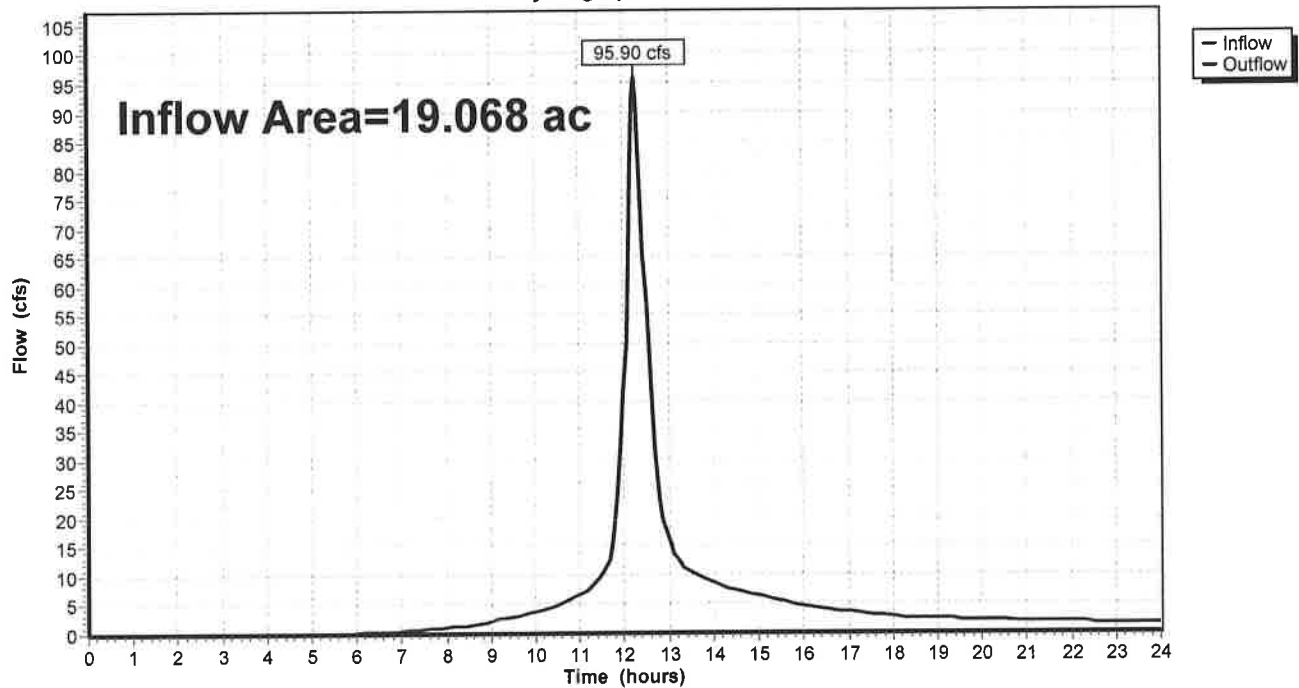
**Summary for Reach 10R: Design Point 2C, Infield Pond**

Inflow Area = 19.068 ac, 9.99% Impervious, Inflow Depth > 6.22" for BWSC-100yr event  
Inflow = 95.90 cfs @ 12.25 hrs, Volume= 9.883 af  
Outflow = 95.90 cfs @ 12.25 hrs, Volume= 9.883 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Reach 10R: Design Point 2C, Infield Pond**

Hydrograph





**285400HC005 - Phase 1 Existing**

Type III 24-hr BWSC-002yr Rainfall=3.20"

Prepared by {enter your company name here}

Printed 11/16/2017

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 2S: EDA-2**Runoff Area=18.510 ac 53.47% Impervious Runoff Depth>1.91"  
Tc=6.0 min CN=87 Runoff=40.65 cfs 2.951 af**Subcatchment 3S: EDA-3A**Runoff Area=7.469 ac 0.86% Impervious Runoff Depth>1.21"  
Flow Length=644' Tc=17.3 min CN=77 Runoff=7.32 cfs 0.751 af**Subcatchment 5S: EDA-5**Runoff Area=19.068 ac 9.99% Impervious Runoff Depth>1.33"  
Flow Length=524' Tc=18.3 min CN=79 Runoff=20.44 cfs 2.115 af**Reach 6R: Design Point 2A, Wetland South of Track**Inflow=40.65 cfs 2.951 af  
Outflow=40.65 cfs 2.951 af**Reach 8R: Design Point 2, Sales Creek**Inflow=7.32 cfs 0.751 af  
Outflow=7.32 cfs 0.751 af**Reach 10R: Design Point 2C, Infield Pond**Inflow=20.44 cfs 2.115 af  
Outflow=20.44 cfs 2.115 af**Total Runoff Area = 45.047 ac Runoff Volume = 5.818 af Average Runoff Depth = 1.55"**  
**73.66% Pervious = 33.182 ac 26.34% Impervious = 11.865 ac**

**285400HC005 - Phase 1 Existing**

Type III 24-hr BWSC-010yr Rainfall=6.00"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 2S: EDA-2**

Runoff Area=18.510 ac 53.47% Impervious Runoff Depth&gt;4.51"

Tc=6.0 min CN=87 Runoff=93.12 cfs 6.963 af

**Subcatchment 3S: EDA-3A**

Runoff Area=7.469 ac 0.86% Impervious Runoff Depth&gt;3.47"

Flow Length=644' Tc=17.3 min CN=77 Runoff=21.68 cfs 2.159 af

**Subcatchment 5S: EDA-5**

Runoff Area=19.068 ac 9.99% Impervious Runoff Depth&gt;3.67"

Flow Length=524' Tc=18.3 min CN=79 Runoff=57.28 cfs 5.828 af

**Reach 6R: Design Point 2A, Wetland South of Track**

Inflow=93.12 cfs 6.963 af

Outflow=93.12 cfs 6.963 af

**Reach 8R: Design Point 2, Sales Creek**

Inflow=21.68 cfs 2.159 af

Outflow=21.68 cfs 2.159 af

**Reach 10R: Design Point 2C, Infield Pond**

Inflow=57.28 cfs 5.828 af

Outflow=57.28 cfs 5.828 af

**Total Runoff Area = 45.047 ac Runoff Volume = 14.949 af Average Runoff Depth = 3.98"****73.66% Pervious = 33.182 ac 26.34% Impervious = 11.865 ac**

**285400HC005 - Phase 1 Existing**

Type III 24-hr BWSC-100yr Rainfall=8.78"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 2S: EDA-2**

Runoff Area=18.510 ac 53.47% Impervious Runoff Depth&gt;7.21"

Tc=6.0 min CN=87 Runoff=144.92 cfs 11.115 af

**Subcatchment 3S: EDA-3A**

Runoff Area=7.469 ac 0.86% Impervious Runoff Depth&gt;5.98"

Flow Length=644' Tc=17.3 min CN=77 Runoff=37.03 cfs 3.720 af

**Subcatchment 5S: EDA-5**

Runoff Area=19.068 ac 9.99% Impervious Runoff Depth&gt;6.22"

Flow Length=524' Tc=18.3 min CN=79 Runoff=95.90 cfs 9.883 af

**Reach 6R: Design Point 2A, Wetland South of Track**

Inflow=144.92 cfs 11.115 af

Outflow=144.92 cfs 11.115 af

**Reach 8R: Design Point 2, Sales Creek**

Inflow=37.03 cfs 3.720 af

Outflow=37.03 cfs 3.720 af

**Reach 10R: Design Point 2C, Infield Pond**

Inflow=95.90 cfs 9.883 af

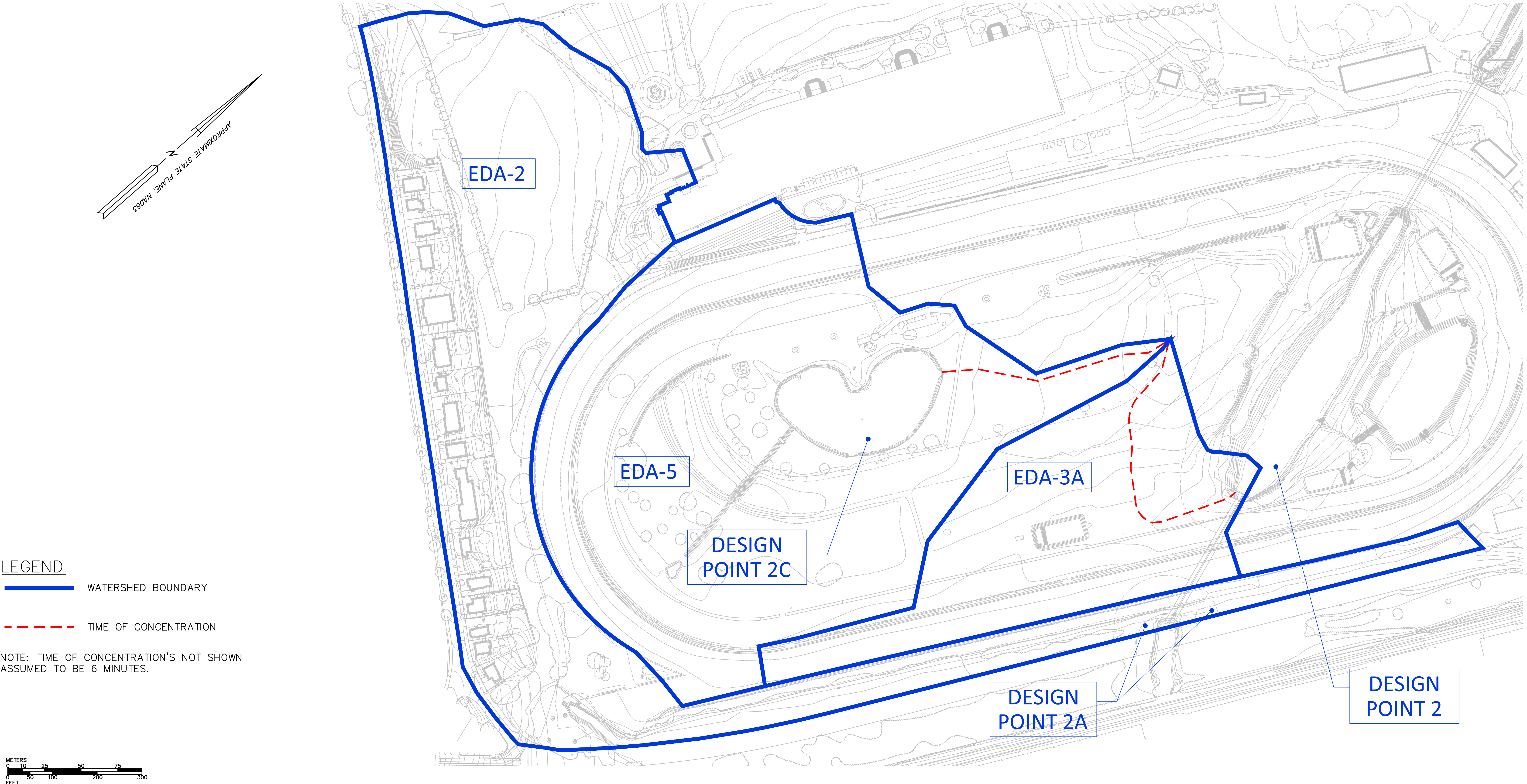
Outflow=95.90 cfs 9.883 af

**Total Runoff Area = 45.047 ac Runoff Volume = 24.718 af Average Runoff Depth = 6.58"****73.66% Pervious = 33.182 ac 26.34% Impervious = 11.865 ac**



# Suffolk Downs

Boston, Massachusetts



**BEALS + THOMAS**

Civil Engineers + Landscape Architects +  
Land Surveyors + Planners +  
Environmental Specialists

## Pre-Development Conditions Hydrology Map

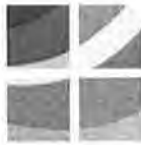
Phase 1



## **Appendix C**

### **Post-Development Hydrologic Analysis**

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**BEALS + THOMAS**

BEALS AND THOMAS, INC.  
Reservoir Corporate Center  
144 Turnpike Road  
Southborough, MA 01772-2104

**CALCULATION SUMMARY**

T 508.366.0560  
F 508.366.4391  
www.bealsandthomas.com  
Regional Office: Plymouth, MA

**JOB NO./LOCATION:**

2854.02  
Boston/Revere, Massachusetts

**CLIENT/PROJECT:**

HYM Investments, LLC  
Suffolk Downs Redevelopment

**SUBJECT/TITLE:**

Proposed Conditions Hydrologic Analysis Phase 1

**OBJECTIVE OF CALCULATION:**

- To determine the post-development peak rates of runoff from the site for the 2, 10 and 100 year storm events

**CALCULATION METHOD(S):**

- CN and Tc determined based on TR-55 methodology.
- Runoff rates computed using HydroCAD version 10.0

**ASSUMPTIONS:**

- Surface cover types and boundaries have been estimated based upon MassGIS, USGS Color Ortho Imagery 2016, aerial photography viewed on Google Earth, and AutoCAD file 285402B004D.dwg
- Upgradient tributary area was based upon data obtained from the MassGIS Oliver program. Surface cover was based on aerial photography viewed on Google Earth.
- Wetland areas modeled as hydrologic soil class "D" soils. Urban Land, Udorthents, and Ipswich Mucky Peat Model as Hydrologic soil class "C" soils.
- Rainfall depth for 10-year storm event and 100-year storm event based on BWSC Climate Change Risk Assessment, Findings and Mitigation/Adaptation Strategies for Wastewater and Storm Drainage dated 01/28/2015.

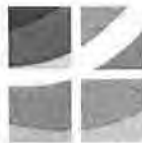
**SOURCES OF DATA/EQUATIONS:**

- Alta/NSPS Land Title Survey, Suffolk Downs, Boston/Revere, Massachusetts, prepared by Beals and Thomas, Inc., dated 05/23/17.
- Post-Development Conditions Hydrologic Areas Map Phase 1, dated 11/30/2017 prepared by Beals and Thomas, Inc.
- TR-55 Urban Hydrology for Small Watersheds, SCS, 1986.
- NRCS Soil Survey for Middlesex Country downloaded from Web Soil Survey 2.0 on 05/04/2017.

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	<i>L. Ennis</i>	11/17/17	<i>E. Calk</i>	11/17/17	<i>E. Calk</i>	11/17/17

EAE/285402CS012

**BEALS + THOMAS**



# BEALS + THOMAS

BEALS AND THOMAS, INC.  
Reservoir Corporate Center  
144 Turnpike Road  
Southborough, MA 01772-2104

## CALCULATION SUMMARY

T 508.366.0560  
F 508.366.4391  
www.bealsandthomas.com  
Regional Office: Plymouth, MA

### CONCLUSIONS:

The following numbers represent the peak rates of runoff from the site under existing conditions

#### Peak Rates of Runoff

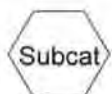
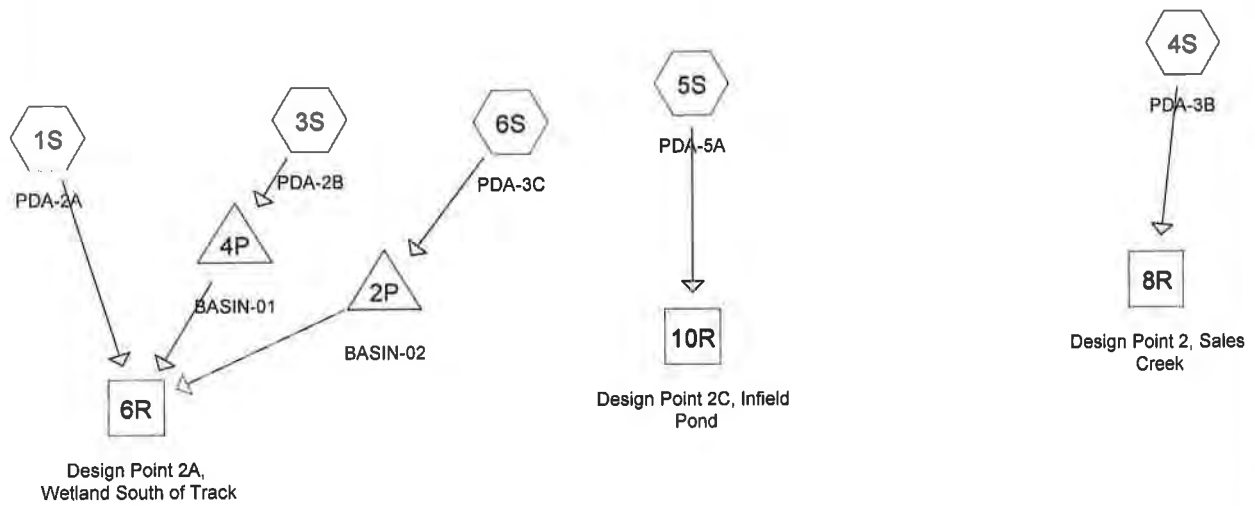
Storm Event	Design Point 2 Sales Creek (cfs)	Design Point 2A Wetland South of the Track (cfs)	Design Point 2C Infield Pond (cfs)
2-year	5.60	35.32	19.13
10-year	16.6	89.08	53.63
100-year	28.34	143.74	89.78

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0			E. Chish	11/17/17	E. Chish	11/17/17

EAE/285402CS012



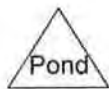
BEALS + THOMAS



Subcat



Reach



Pond



Link

#### Routing Diagram for 285400HC006

Prepared by Beals and Thomas, Printed 11/17/2017

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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
1.198	61	>75% Grass cover, Good, HSG B (1S, 5S)
21.054	74	>75% Grass cover, Good, HSG C (1S, 3S, 4S, 5S, 6S)
0.207	73	Brush, Good, HSG D (4S, 5S)
1.220	73	Brush, Good, HSG D (Wetland) (1S)
2.945	87	Dirt track, HSG C (4S, 5S)
0.521	96	Gravel surface, HSG C (1S)
1.686	98	Paved parking, HSG B (1S, 5S)
10.327	98	Paved parking, HSG C (1S, 3S, 4S, 5S, 6S)
3.392	98	Roof (6S)
1.021	98	Roofs, HSG B (1S, 5S)
0.130	98	Roofs, HSG C (1S, 5S)
0.022	98	Water Surface, HSG B (1S, 5S)
1.336	98	Water Surface, HSG C (1S, 4S, 5S)
<b>45.059</b>	<b>84</b>	<b>TOTAL AREA</b>

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: PDA-2A</b>	Runoff Area=13.648 ac 60.51% Impervious Runoff Depth>2.08" Tc=6.0 min CN=89 Runoff=32.39 cfs 2.365 af
<b>Subcatchment 3S: PDA-2B</b>	Runoff Area=1.958 ac 75.94% Impervious Runoff Depth>2.35" Tc=6.0 min CN=92 Runoff=5.15 cfs 0.383 af
<b>Subcatchment 4S: PDA-3B</b>	Runoff Area=5.716 ac 1.12% Impervious Runoff Depth>1.21" Flow Length=644' Tc=17.3 min CN=77 Runoff=5.60 cfs 0.575 af
<b>Subcatchment 5S: PDA-5A</b>	Runoff Area=17.851 ac 16.79% Impervious Runoff Depth>1.33" Flow Length=524' Tc=18.3 min CN=79 Runoff=19.13 cfs 1.980 af
<b>Subcatchment 6S: PDA-3C</b>	Runoff Area=5.886 ac 86.78% Impervious Runoff Depth>2.64" Tc=6.0 min CN=95 Runoff=16.86 cfs 1.296 af
<b>Reach 6R: Design Point 2A, Wetland South of Track</b>	Inflow=35.32 cfs 3.382 af Outflow=35.32 cfs 3.382 af
<b>Reach 8R: Design Point 2, Sales Creek</b>	Inflow=5.60 cfs 0.575 af Outflow=5.60 cfs 0.575 af
<b>Reach 10R: Design Point 2C, Infield Pond</b>	Inflow=19.13 cfs 1.980 af Outflow=19.13 cfs 1.980 af
<b>Pond 2P: BASIN-02</b>	Peak Elev=17.66' Storage=26,316 cf Inflow=16.86 cfs 1.296 af Discarded=0.07 cfs 0.098 af Primary=5.35 cfs 0.908 af Outflow=5.42 cfs 1.006 af
<b>Pond 4P: BASIN-01</b>	Peak Elev=16.79' Storage=8,908 cf Inflow=5.15 cfs 0.383 af Discarded=0.07 cfs 0.082 af Primary=1.05 cfs 0.109 af Outflow=1.12 cfs 0.191 af
<b>Total Runoff Area = 45.059 ac Runoff Volume = 6.601 af Average Runoff Depth = 1.76"</b> <b>60.24% Pervious = 27.145 ac 39.76% Impervious = 17.914 ac</b>	

**Summary for Subcatchment 1S: PDA-2A**

Runoff = 32.39 cfs @ 12.09 hrs, Volume= 2.365 af, Depth> 2.08"

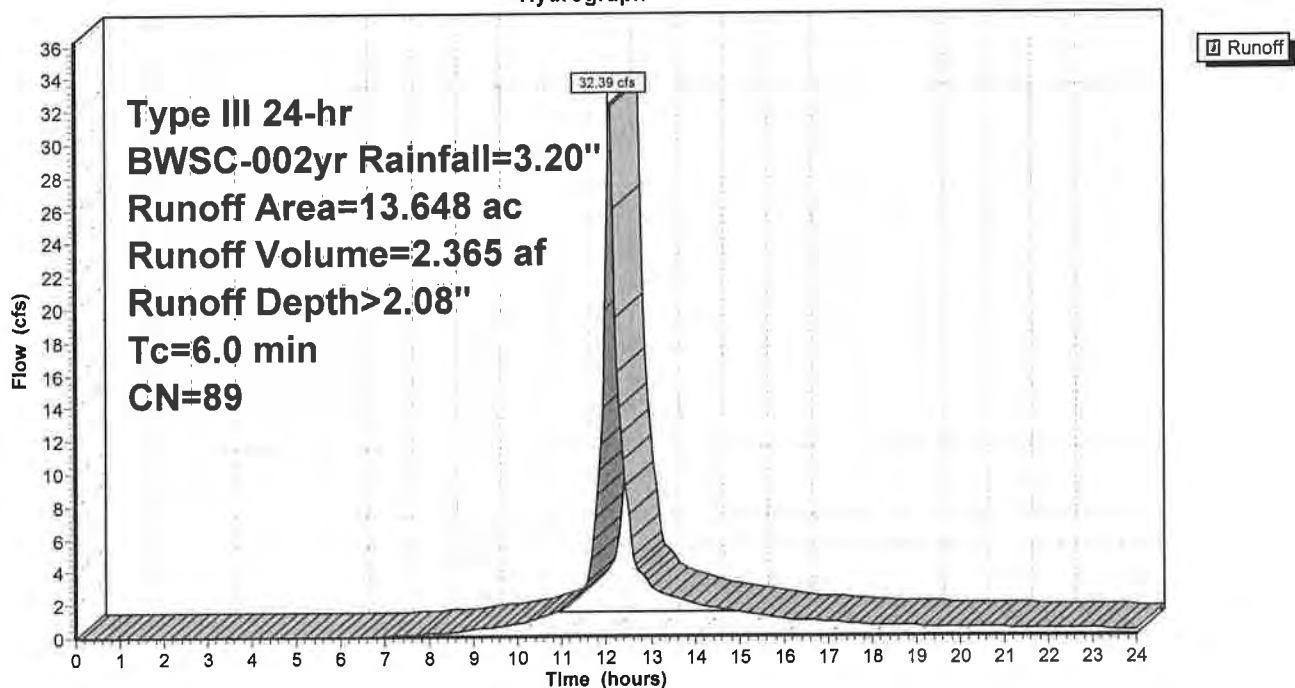
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr BWSC-002yr Rainfall=3.20"

Area (ac)	CN	Description
* 1.220	73	Brush, Good, HSG D (Wetland)
0.018	98	Roofs, HSG C
0.727	98	Roofs, HSG B
1.180	98	Paved parking, HSG B
6.296	98	Paved parking, HSG C
0.031	98	Water Surface, HSG C
3.068	74	>75% Grass cover, Good, HSG C
0.581	61	>75% Grass cover, Good, HSG B
0.521	96	Gravel surface, HSG C
0.006	98	Water Surface, HSG B
13.648	89	Weighted Average
5.390		39.49% Pervious Area
8.258		60.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, direct entry

**Subcatchment 1S: PDA-2A**

Hydrograph



**Summary for Subcatchment 3S: PDA-2B**

Runoff = 5.15 cfs @ 12.09 hrs, Volume= 0.383 af, Depth> 2.35"

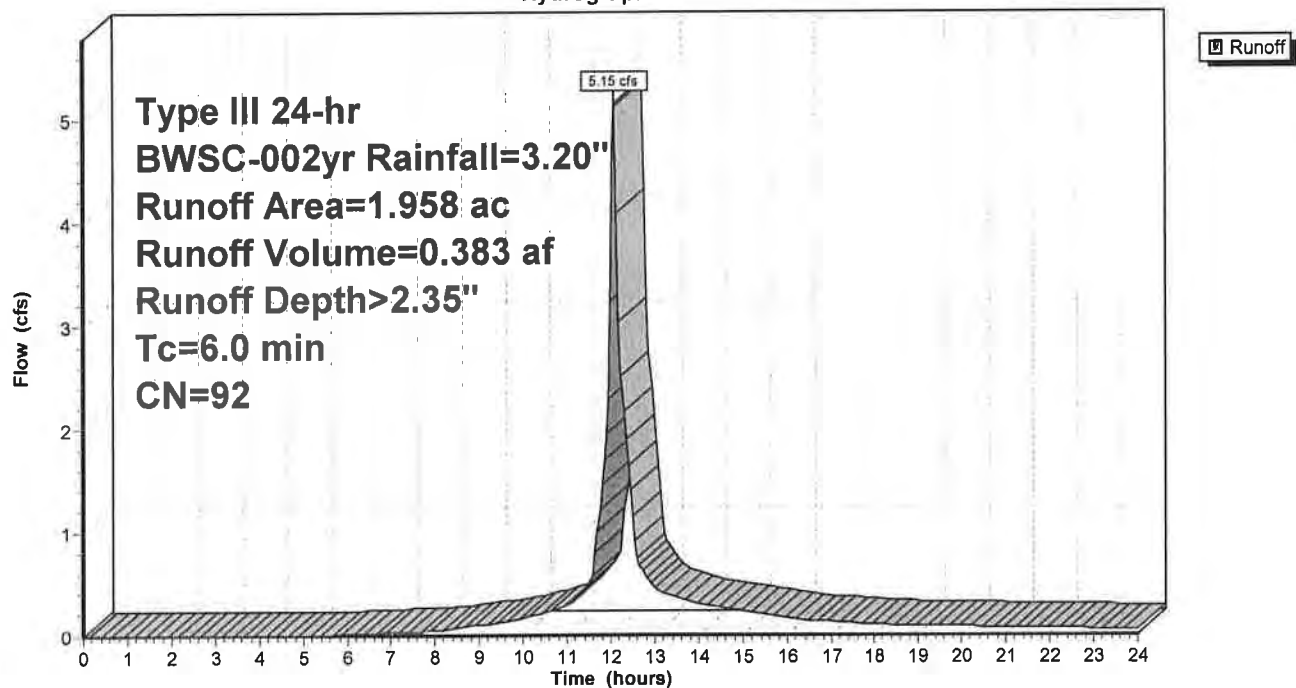
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr BWSC-002yr Rainfall=3.20"

Area (ac)	CN	Description
1.487	98	Paved parking, HSG C
0.471	74	>75% Grass cover, Good, HSG C
1.958	92	Weighted Average
0.471		24.06% Pervious Area
1.487		75.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

**Subcatchment 3S: PDA-2B**

Hydrograph



**Summary for Subcatchment 4S: PDA-3B**

Runoff = 5.60 cfs @ 12.25 hrs, Volume= 0.575 af, Depth> 1.21"

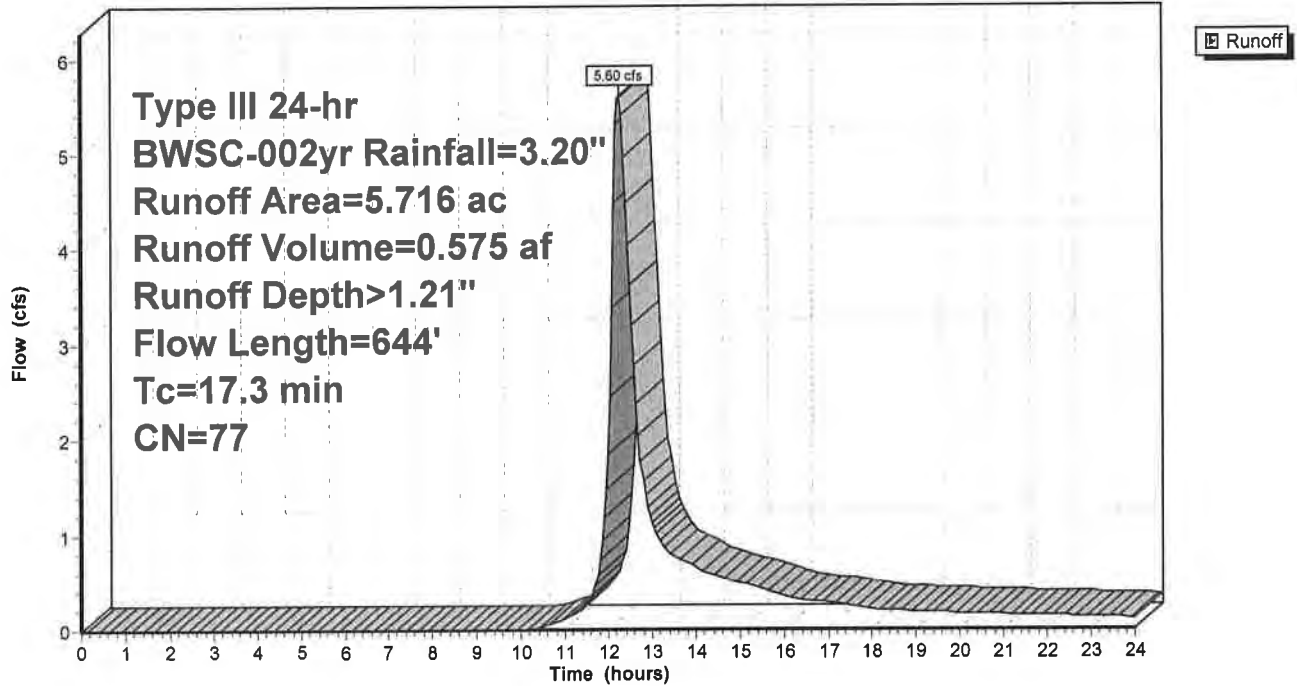
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr BWSC-002yr Rainfall=3.20"

Area (ac)	CN	Description
4.517	74	>75% Grass cover, Good, HSG C
* 1.073	87	Dirt track, HSG C
0.006	98	Paved parking, HSG C
0.062	73	Brush, Good, HSG D
0.058	98	Water Surface, HSG C
5.716	77	Weighted Average
5.652		98.88% Pervious Area
0.064		1.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	47	0.0217	0.15		<b>Sheet Flow, Grass</b> Grass: Short n= 0.150 P2= 3.20"
1.3	68	0.0150	0.86		<b>Shallow Concentrated Flow, Grass</b> Short Grass Pasture Kv= 7.0 fps
2.0	89	0.0110	0.73		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
1.0	55	0.0180	0.94		<b>Shallow Concentrated Flow, Grass</b> Short Grass Pasture Kv= 7.0 fps
0.7	46	0.0217	1.03		<b>Shallow Concentrated Flow, Grass</b> Short Grass Pasture Kv= 7.0 fps
1.6	75	0.0130	0.80		<b>Shallow Concentrated Flow, Grass</b> Short Grass Pasture Kv= 7.0 fps
1.3	65	0.0150	0.86		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
3.1	118	0.0080	0.63		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.9	52	0.0190	0.96		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.2	16	0.0625	1.75		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.0	13	0.3846	4.34		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
17.3	644	Total			

**Subcatchment 4S: PDA-3B**

Hydrograph



**Summary for Subcatchment 5S: PDA-5A**

Runoff = 19.13 cfs @ 12.26 hrs, Volume= 1.980 af, Depth> 1.33"

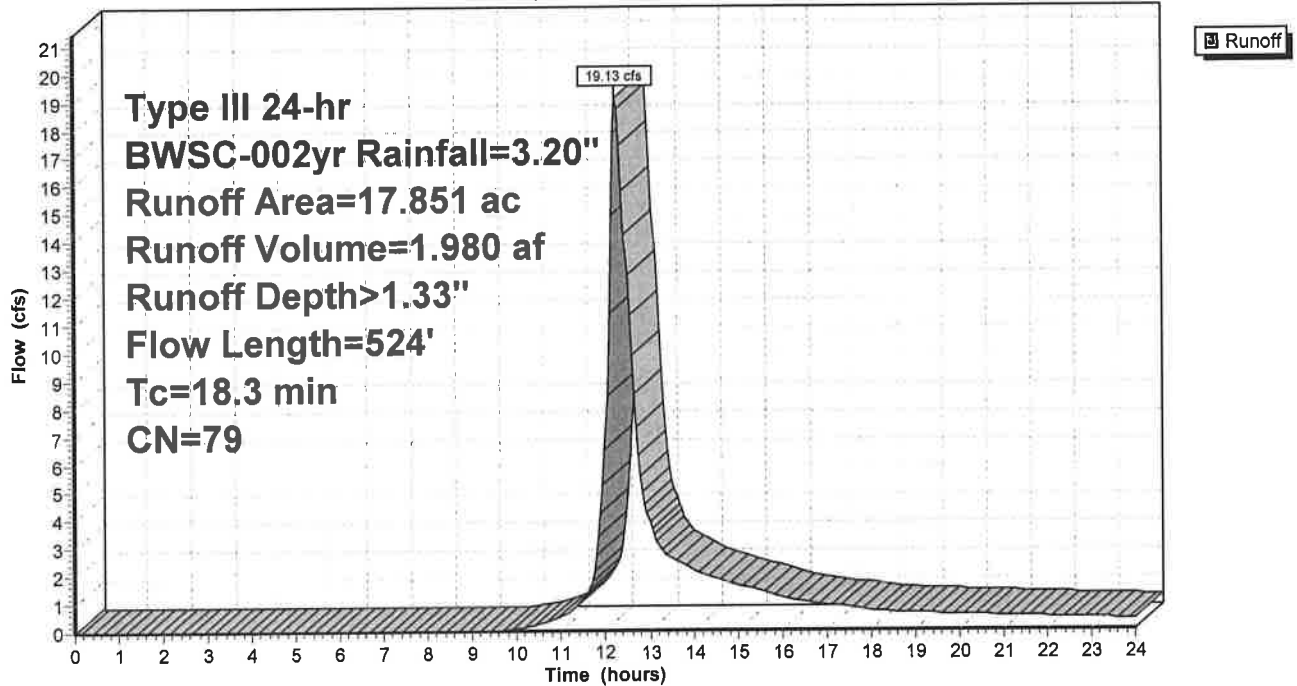
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr BWSC-002yr Rainfall=3.20"

Area (ac)	CN	Description
1.247	98	Water Surface, HSG C
* 1.872	87	Dirt track, HSG C
12.220	74	>75% Grass cover, Good, HSG C
0.112	98	Roofs, HSG C
0.145	73	Brush, Good, HSG D
0.822	98	Paved parking, HSG C
0.506	98	Paved parking, HSG B
0.294	98	Roofs, HSG B
0.016	98	Water Surface, HSG B
0.617	61	>75% Grass cover, Good, HSG B
17.851	79	Weighted Average
14.854		83.21% Pervious Area
2.997		16.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		<b>Sheet Flow, grass</b> Grass: Short n= 0.150 P2= 3.20"
1.1	60	0.0167	0.90		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
6.6	197	0.0050	0.49		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
3.9	136	0.0070	0.59		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.7	44	0.0227	1.05		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.0	7	0.1429	2.65		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
0.4	30	0.0333	1.28		<b>Shallow Concentrated Flow, grass</b> Short Grass Pasture Kv= 7.0 fps
18.3	524	Total			

**Subcatchment 5S: PDA-5A**

Hydrograph





**Summary for Subcatchment 6S: PDA-3C**

Runoff = 16.86 cfs @ 12.09 hrs, Volume= 1.296 af, Depth> 2.64"

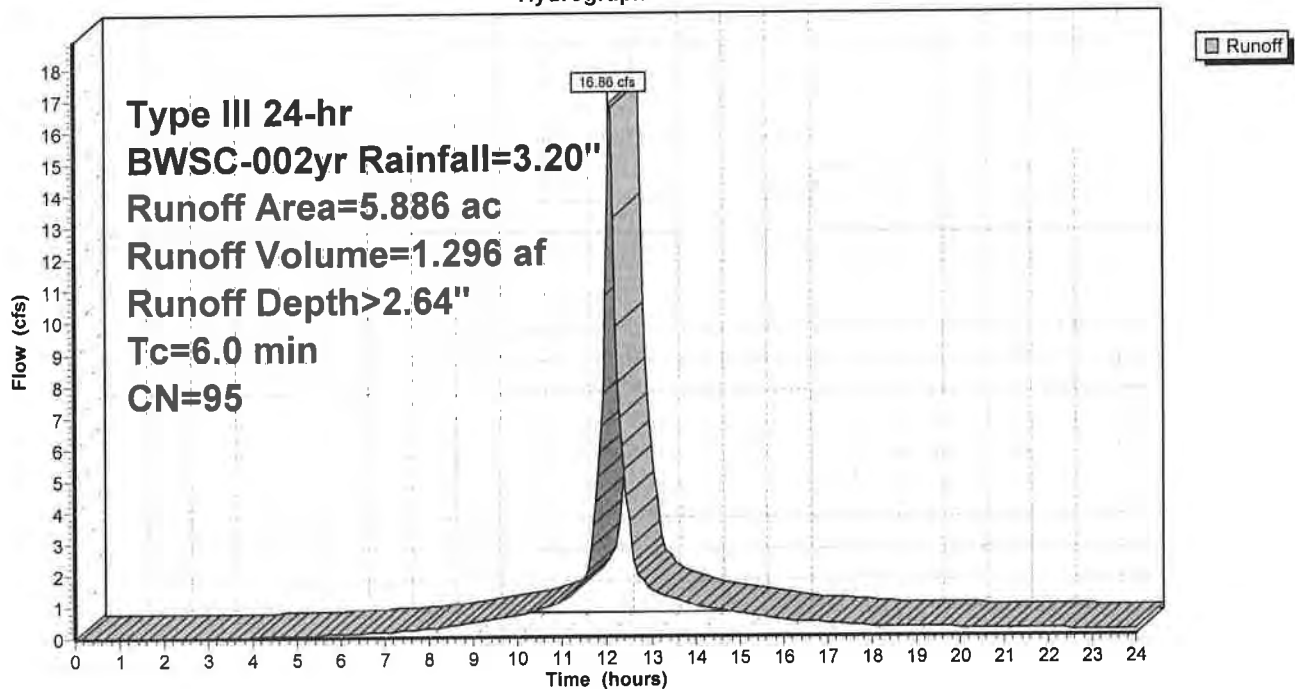
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr BWSC-002yr Rainfall=3.20"

Area (ac)	CN	Description
0.778	74	>75% Grass cover, Good, HSG C
1.716	98	Paved parking, HSG C
* 3.392	98	Roof
5.886	95	Weighted Average
0.778		13.22% Pervious Area
5.108		86.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

**Subcatchment 6S: PDA-3C**

Hydrograph

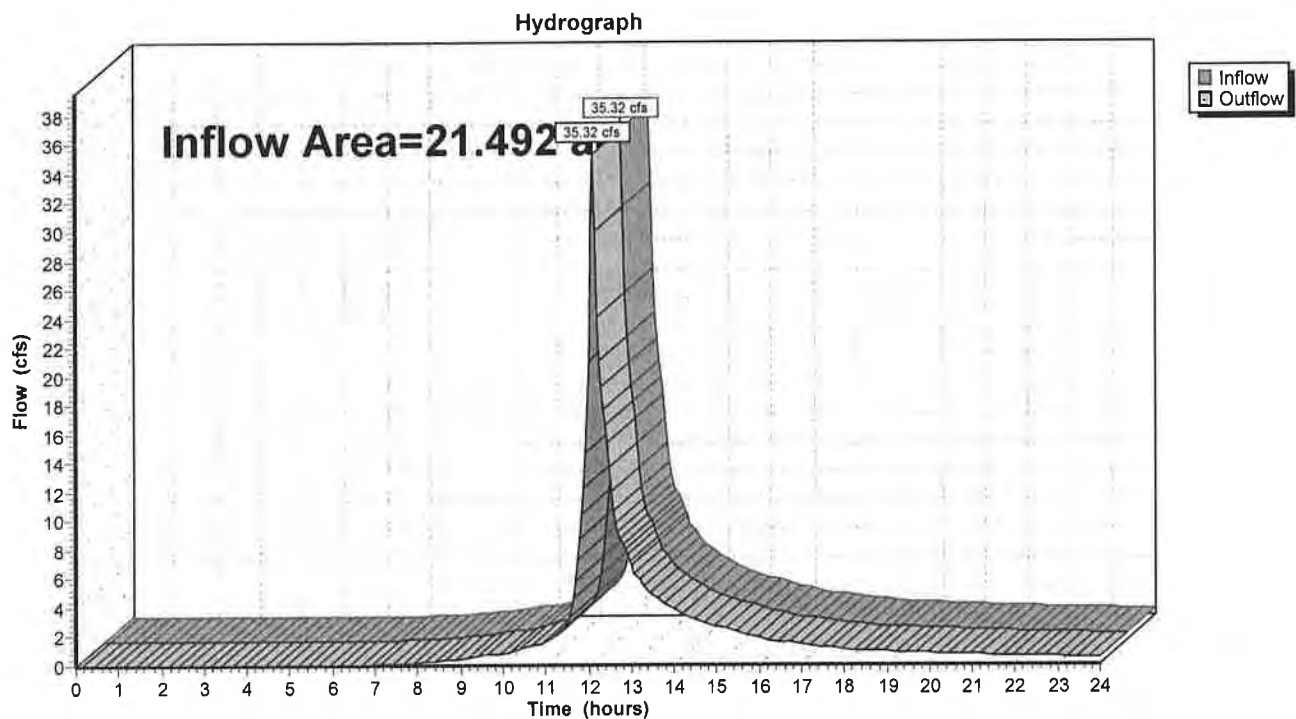


**Summary for Reach 6R: Design Point 2A, Wetland South of Track**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 21.492 ac, 69.11% Impervious, Inflow Depth > 1.89" for BWSC-002yr event  
Inflow = 35.32 cfs @ 12.10 hrs, Volume= 3.382 af  
Outflow = 35.32 cfs @ 12.10 hrs, Volume= 3.382 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

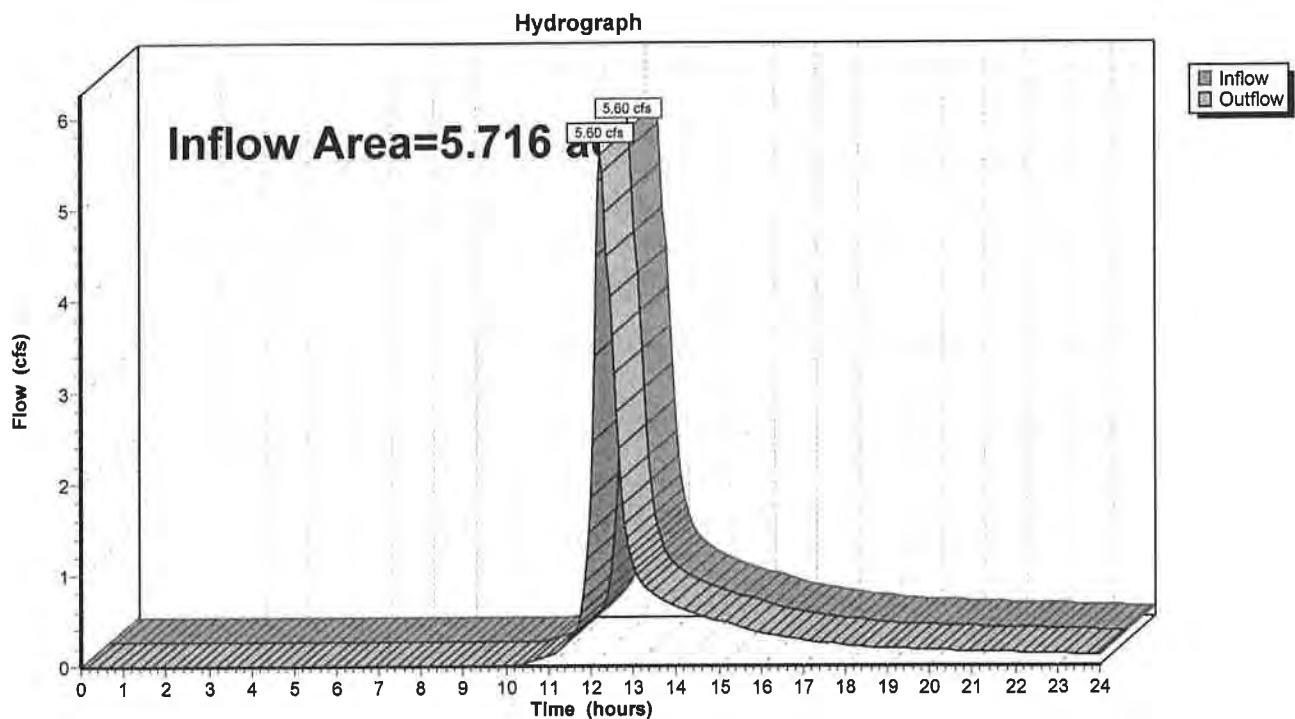
**Reach 6R: Design Point 2A, Wetland South of Track**

**Summary for Reach 8R: Design Point 2, Sales Creek**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.716 ac, 1.12% Impervious, Inflow Depth > 1.21" for BWSC-002yr event  
Inflow = 5.60 cfs @ 12.25 hrs, Volume= 0.575 af  
Outflow = 5.60 cfs @ 12.25 hrs, Volume= 0.575 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

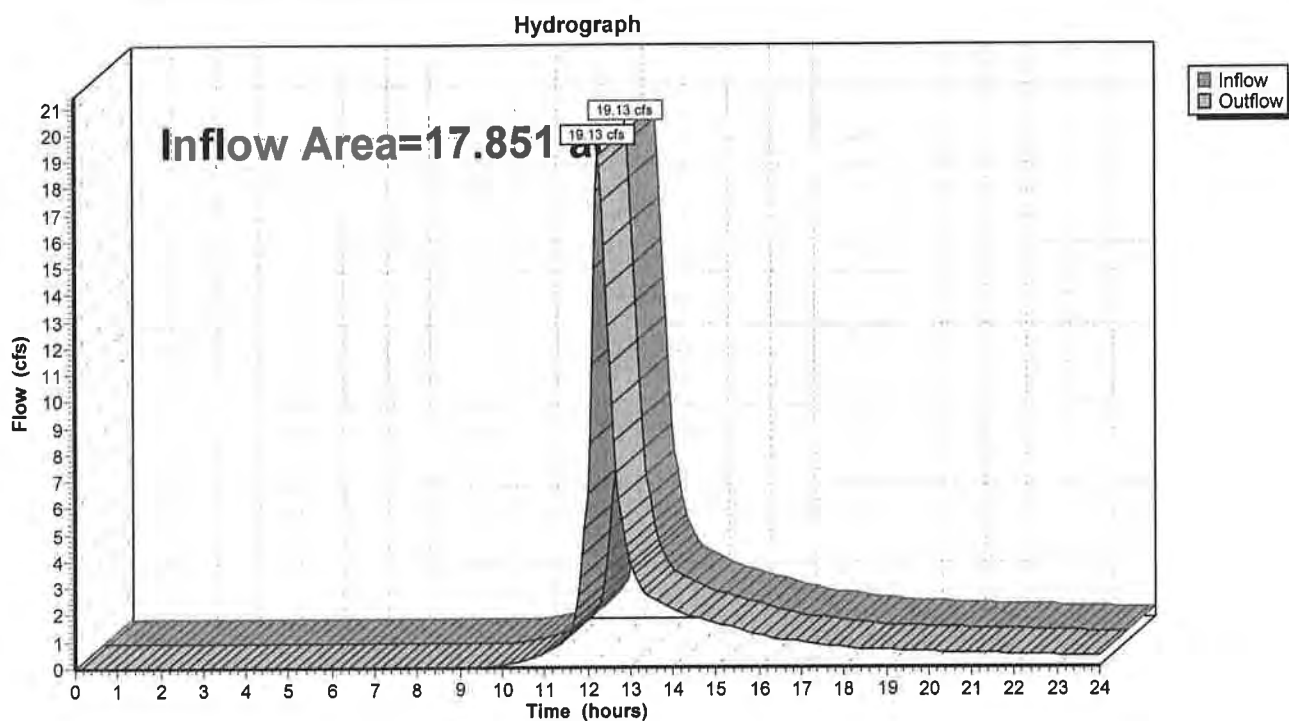
**Reach 8R: Design Point 2, Sales Creek**

**Summary for Reach 10R: Design Point 2C, Infield Pond**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 17.851 ac, 16.79% Impervious, Inflow Depth > 1.33" for BWSC-002yr event  
Inflow = 19.13 cfs @ 12.26 hrs, Volume= 1.980 af  
Outflow = 19.13 cfs @ 12.26 hrs, Volume= 1.980 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Reach 10R: Design Point 2C, Infield Pond**

**Summary for Pond 2P: BASIN-02**

Inflow Area = 5.886 ac, 86.78% Impervious, Inflow Depth > 2.64" for BWSC-002yr event  
 Inflow = 16.86 cfs @ 12.09 hrs, Volume= 1.296 af  
 Outflow = 5.42 cfs @ 12.39 hrs, Volume= 1.006 af, Atten= 68%, Lag= 18.2 min  
 Discarded = 0.07 cfs @ 12.39 hrs, Volume= 0.098 af  
 Primary = 5.35 cfs @ 12.39 hrs, Volume= 0.908 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 17.66' @ 12.39 hrs Surf.Area= 17,160 sf Storage= 26,316 cf

Plug-Flow detention time= 173.1 min calculated for 1.006 af (78% of inflow)  
 Center-of-Mass det. time= 93.6 min ( 874.1 - 780.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	16.00'	71,000 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.00	14,500	0	0
17.00	16,100	15,300	15,300
18.00	17,700	16,900	32,200
19.00	19,400	18,550	50,750
20.00	21,100	20,250	71,000

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.00'	<b>0.170 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = 0.00'
#2	Primary	16.70'	<b>15.0" Round Culvert X 2.00</b> L= 140.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 16.70' / 15.63' S= 0.0076 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Primary	18.35'	<b>10.0' long x 8.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

**Discarded OutFlow** Max=0.07 cfs @ 12.39 hrs HW=17.66' (Free Discharge)

↑1=Exfiltration ( Controls 0.07 cfs)

**Primary OutFlow** Max=5.34 cfs @ 12.39 hrs HW=17.66' (Free Discharge)

↑2=Culvert (Inlet Controls 5.34 cfs @ 2.64 fps)

↑3=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

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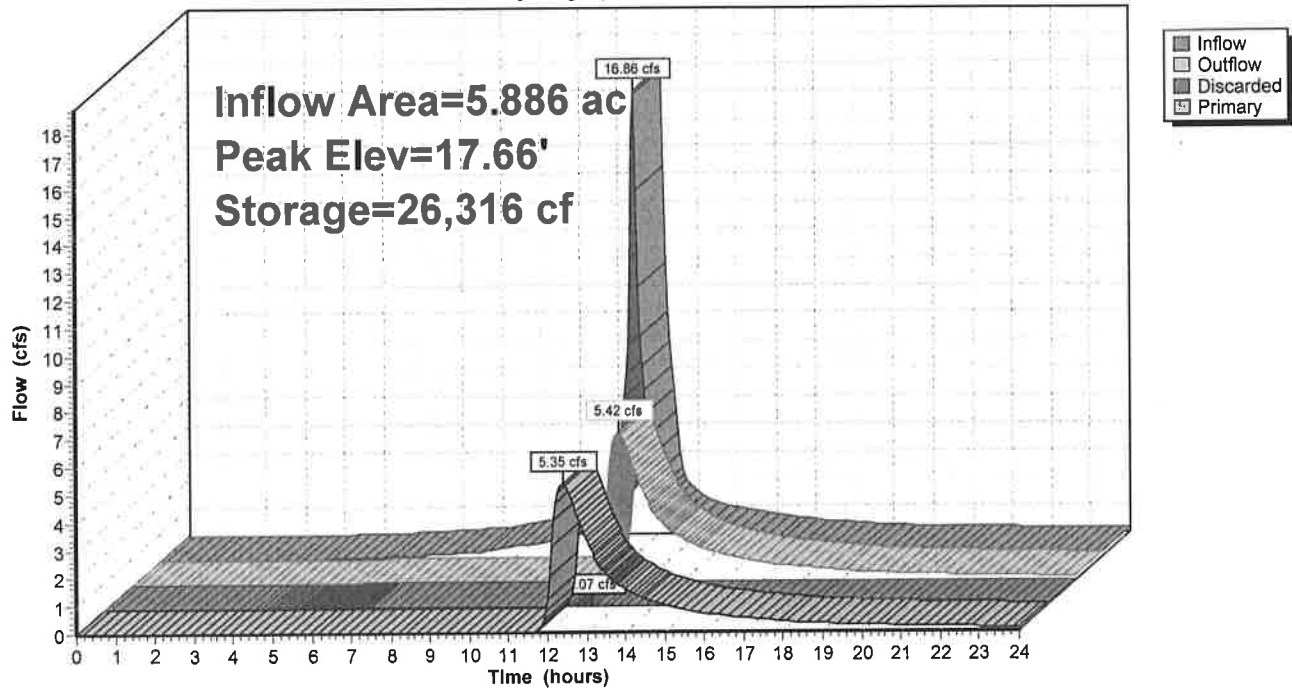
Type III 24-hr BWSC-002yr Rainfall=3.20"

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Page 15

## Pond 2P: BASIN-02

Hydrograph



**Summary for Pond 4P: BASIN-01**

Inflow Area = 1.958 ac, 75.94% Impervious, Inflow Depth > 2.35" for BWSC-002yr event  
 Inflow = 5.15 cfs @ 12.09 hrs, Volume= 0.383 af  
 Outflow = 1.12 cfs @ 12.51 hrs, Volume= 0.191 af, Atten= 78%, Lag= 25.5 min  
 Discarded = 0.07 cfs @ 12.51 hrs, Volume= 0.082 af  
 Primary = 1.05 cfs @ 12.51 hrs, Volume= 0.109 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 16.79' @ 12.51 hrs Surf.Area= 5,152 sf Storage= 8,908 cf

Plug-Flow detention time= 222.6 min calculated for 0.191 af (50% of inflow)  
 Center-of-Mass det. time= 111.2 min ( 908.5 - 797.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	14.50'	16,050 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.50	2,800	0	0
15.00	3,200	1,500	1,500
16.00	4,200	3,700	5,200
17.00	5,400	4,800	10,000
18.00	6,700	6,050	16,050

Device	Routing	Invert	Outlet Devices
#1	Discarded	14.50'	<b>0.520 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = 0.00'
#2	Primary	16.70'	<b>15.0' long x 8.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

**Discarded OutFlow** Max=0.07 cfs @ 12.51 hrs HW=16.79' (Free Discharge)

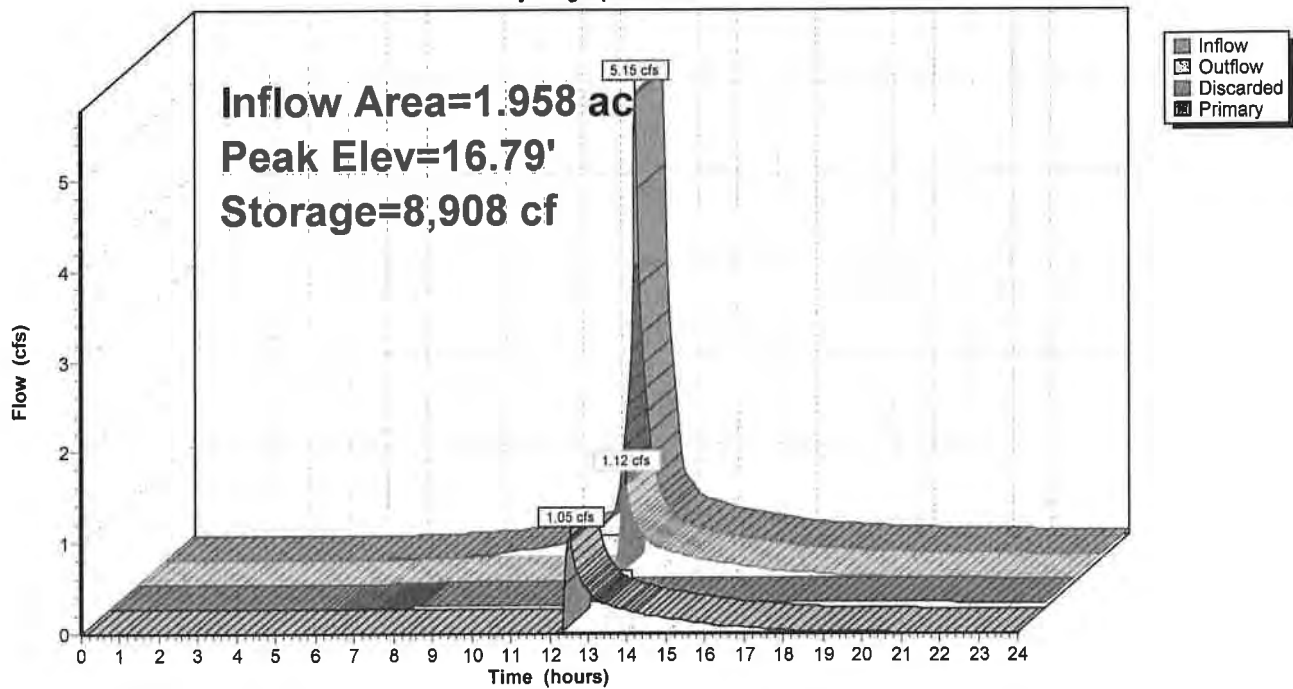
↑1=Exfiltration ( Controls 0.07 cfs)

**Primary OutFlow** Max=1.02 cfs @ 12.51 hrs HW=16.79' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 1.02 cfs @ 0.74 fps)

**Pond 4P: BASIN-01**

Hydrograph





Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1S: PDA-2A** Runoff Area=13.648 ac 60.51% Impervious Runoff Depth>2.08"  
Tc=6.0 min CN=89 Runoff=32.39 cfs 2.365 af

**Subcatchment3S: PDA-2B** Runoff Area=1.958 ac 75.94% Impervious Runoff Depth>2.35"  
Tc=6.0 min CN=92 Runoff=5.15 cfs 0.383 af

**Subcatchment4S: PDA-3B** Runoff Area=5.716 ac 1.12% Impervious Runoff Depth>1.21"  
Flow Length=644' Tc=17.3 min CN=77 Runoff=5.60 cfs 0.575 af

**Subcatchment5S: PDA-5A** Runoff Area=17.851 ac 16.79% Impervious Runoff Depth>1.33"  
Flow Length=524' Tc=18.3 min CN=79 Runoff=19.13 cfs 1.980 af

**Subcatchment6S: PDA-3C** Runoff Area=5.886 ac 86.78% Impervious Runoff Depth>2.64"  
Tc=6.0 min CN=95 Runoff=16.86 cfs 1.296 af

**Reach 6R: Design Point 2A, Wetland South of Track** Inflow=35.32 cfs 3.382 af  
Outflow=35.32 cfs 3.382 af

**Reach 8R: Design Point 2, Sales Creek** Inflow=5.60 cfs 0.575 af  
Outflow=5.60 cfs 0.575 af

**Reach 10R: Design Point 2C, Infield Pond** Inflow=19.13 cfs 1.980 af  
Outflow=19.13 cfs 1.980 af

**Pond 2P: BASIN-02** Peak Elev=17.66' Storage=26,316 cf Inflow=16.86 cfs 1.296 af  
Discarded=0.07 cfs 0.098 af Primary=5.35 cfs 0.908 af Outflow=5.42 cfs 1.006 af

**Pond 4P: BASIN-01** Peak Elev=16.79' Storage=8,908 cf Inflow=5.15 cfs 0.383 af  
Discarded=0.07 cfs 0.082 af Primary=1.05 cfs 0.109 af Outflow=1.12 cfs 0.191 af

**Total Runoff Area = 45.059 ac Runoff Volume = 6.601 af Average Runoff Depth = 1.76"**  
**60.24% Pervious = 27.145 ac 39.76% Impervious = 17.914 ac**

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Type III 24-hr BWSC-010yr Rainfall=6.00"

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Page 18

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: PDA-2A** Runoff Area=13.648 ac 60.51% Impervious Runoff Depth>4.73"  
Tc=6.0 min CN=89 Runoff=71.09 cfs 5.382 af

**Subcatchment 3S: PDA-2B** Runoff Area=1.958 ac 75.94% Impervious Runoff Depth>5.07"  
Tc=6.0 min CN=92 Runoff=10.66 cfs 0.827 af

**Subcatchment 4S: PDA-3B** Runoff Area=5.716 ac 1.12% Impervious Runoff Depth>3.47"  
Flow Length=644' Tc=17.3 min CN=77 Runoff=16.60 cfs 1.652 af

**Subcatchment 5S: PDA-5A** Runoff Area=17.851 ac 16.79% Impervious Runoff Depth>3.67"  
Flow Length=524' Tc=18.3 min CN=79 Runoff=53.63 cfs 5.456 af

**Subcatchment 6S: PDA-3C** Runoff Area=5.886 ac 86.78% Impervious Runoff Depth>5.41"  
Tc=6.0 min CN=95 Runoff=33.13 cfs 2.653 af

**Reach 6R: Design Point 2A, Wetland South of Track** Inflow=89.09 cfs 8.147 af  
Outflow=89.09 cfs 8.147 af

**Reach 8R: Design Point 2, Sales Creek** Inflow=16.60 cfs 1.652 af  
Outflow=16.60 cfs 1.652 af

**Reach 10R: Design Point 2C, Infield Pond** Inflow=53.63 cfs 5.456 af  
Outflow=53.63 cfs 5.456 af

**Pond 2P: BASIN-02** Peak Elev=18.61' Storage=43,259 cf Inflow=33.13 cfs 2.653 af  
Discarded=0.08 cfs 0.113 af Primary=13.78 cfs 2.227 af Outflow=13.86 cfs 2.340 af

**Pond 4P: BASIN-01** Peak Elev=17.10' Storage=10,540 cf Inflow=10.66 cfs 0.827 af  
Discarded=0.08 cfs 0.094 af Primary=9.59 cfs 0.538 af Outflow=9.66 cfs 0.632 af

**Total Runoff Area = 45.059 ac Runoff Volume = 15.969 af Average Runoff Depth = 4.25"**  
**60.24% Pervious = 27.145 ac 39.76% Impervious = 17.914 ac**

**285400HC006**

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Type III 24-hr BWSC-100yr Rainfall=8.78"

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Page 19

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: PDA-2A** Runoff Area=13.648 ac 60.51% Impervious Runoff Depth>7.45"  
Tc=6.0 min CN=89 Runoff=109.02 cfs 8.471 af

**Subcatchment 3S: PDA-2B** Runoff Area=1.958 ac 75.94% Impervious Runoff Depth>7.81"  
Tc=6.0 min CN=92 Runoff=16.03 cfs 1.275 af

**Subcatchment 4S: PDA-3B** Runoff Area=5.716 ac 1.12% Impervious Runoff Depth>5.98"  
Flow Length=644' Tc=17.3 min CN=77 Runoff=28.34 cfs 2.847 af

**Subcatchment 5S: PDA-5A** Runoff Area=17.851 ac 16.79% Impervious Runoff Depth>6.22"  
Flow Length=524' Tc=18.3 min CN=79 Runoff=89.78 cfs 9.252 af

**Subcatchment 6S: PDA-3C** Runoff Area=5.886 ac 86.78% Impervious Runoff Depth>8.17"  
Tc=6.0 min CN=95 Runoff=49.06 cfs 4.009 af

**Reach 6R: Design Point 2A, Wetland South of Track** Inflow=143.74 cfs 13.007 af  
Outflow=143.74 cfs 13.007 af

**Reach 8R: Design Point 2, Sales Creek** Inflow=28.34 cfs 2.847 af  
Outflow=28.34 cfs 2.847 af

**Reach 10R: Design Point 2C, Infield Pond** Inflow=89.78 cfs 9.252 af  
Outflow=89.78 cfs 9.252 af

**Pond 2P: BASIN-02** Peak Elev=19.08' Storage=52,288 cf Inflow=49.06 cfs 4.009 af  
Discarded=0.09 cfs 0.120 af Primary=29.12 cfs 3.558 af Outflow=29.21 cfs 3.679 af

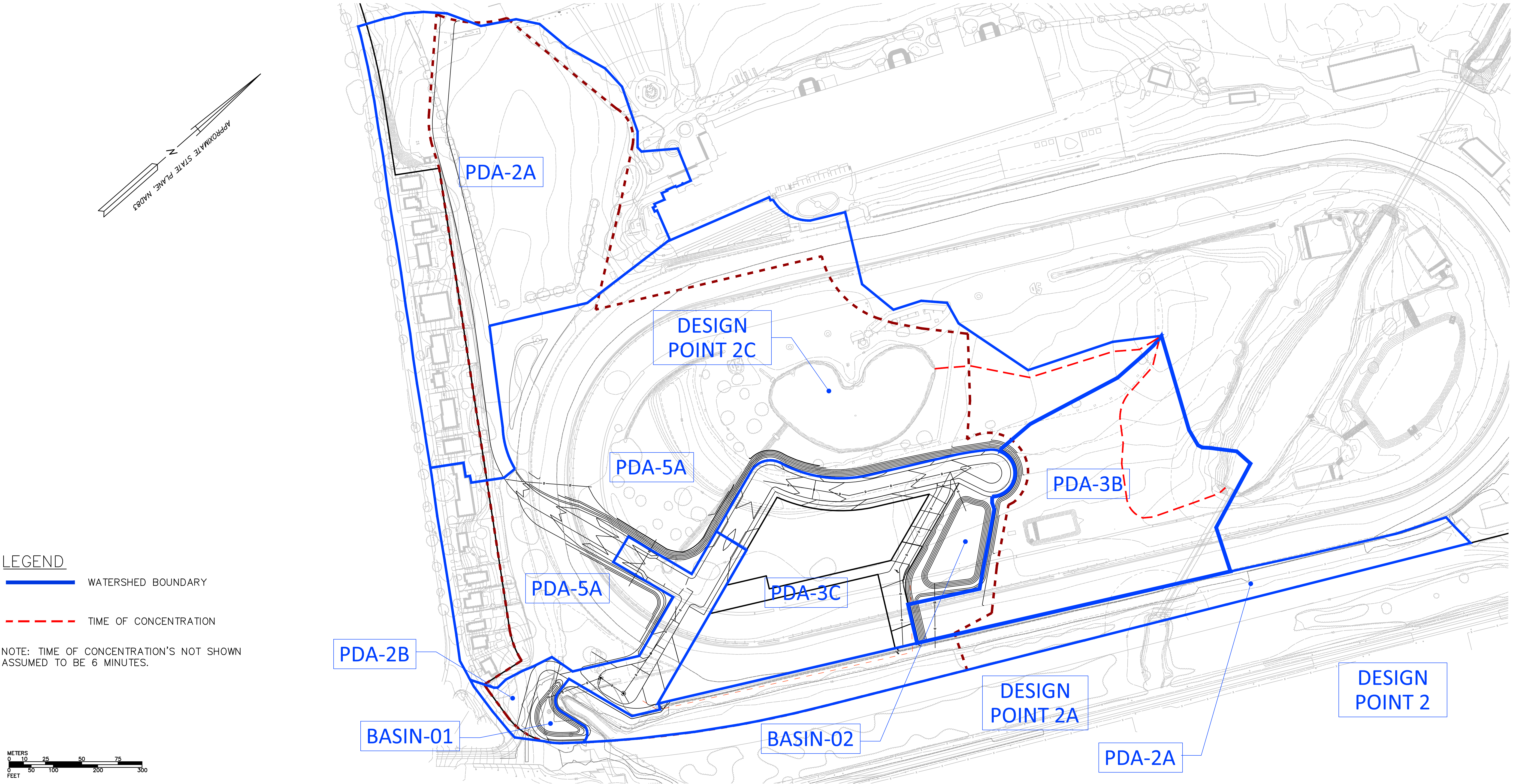
**Pond 4P: BASIN-01** Peak Elev=17.22' Storage=11,230 cf Inflow=16.03 cfs 1.275 af  
Discarded=0.08 cfs 0.102 af Primary=14.91 cfs 0.977 af Outflow=14.98 cfs 1.079 af

**Total Runoff Area = 45.059 ac Runoff Volume = 25.854 af Average Runoff Depth = 6.89"**  
**60.24% Pervious = 27.145 ac 39.76% Impervious = 17.914 ac**



# Suffolk Downs

Boston, Massachusetts



LEGEND

— WATERSHED BOUNDARY

- - - TIME OF CONCENTRATION

NOTE: TIME OF CONCENTRATION'S NOT SHOWN ASSUMED TO BE 6 MINUTES.



**BEALS + THOMAS**  
Civil Engineers + Landscape Architects +  
Land Surveyors + Planners +  
Environmental Specialists

## Post-Development Conditions Hydrology Map

Phase 1



**Appendix D**

**TSS Removal, Water Quality Volume, and Recharge Calculations**

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# BEALS + THOMAS

## Standard 3: Groundwater Recharge

### Groundwater Recharge Volume Required:

$R_v = F \times \text{Impervious Area}$ , where:

$R_v$  = Required Recharge Volume [Ac-ft]

$F$  = Target Depth Factor associated with each Hydrologic Soil Group (HSG) [in]

**Impervious Area** = Total Pavement and Rooftop Area under Post-development Conditions [Ac]

			Impervious Area [Acres]	Required Recharge Volume [Ac-ft]
HSG "A", use F =	0.6	in	0.000	0.000
HSG "B", use F =	0.35	in	0.000	0.000
HSG "C", use F =	0.25	in	6.049	0.126
HSG "D", use F =	0.1	in	0.000	0.000
<b>Total Required Recharge Volume (<math>R_v</math>) =</b>				<b>0.126</b> Ac-ft

### Capture Area Adjustment: (Ref: DEP Handbook V.3 Ch.1 P.27-28)

Total Site Impervious Area (Total) = 6.424 Acres

Impervious Area Draining to Infiltrative BMPs (infil) = 5.76 Acres

Percent Imp. Area Draining to Infiltrative BMPs = 89.6%

Capture Area Adjustment Factor = (Total)/(Infil) =  $C_a$  = 1.12

**Adjusted Required Recharge Volume =  $C_a \times R_v$**  **0.141** Ac-ft

### Groundwater Recharge Volume Provided :

BMP	Provided Recharge Volume [Ac-ft]
Infiltration Basin 1 =	0.194
Infiltration Basin 2 =	0.242
<b>Total Provided Recharge Volume =</b>	<b>0.436</b> Ac-ft

**PROVIDED GROUNDWATER RECHARGE VOLUME IS GREATER THAN OR EQUAL TO THE REQUIRED RECHARGE VOLUME,  
THEREFORE PROPOSED STORMWATER MANAGEMENT DESIGN IS IN COMPLIANCE WITH STANDARD 3.**

JOB NO. 2854.03

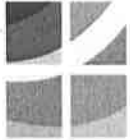
JOB: Suffolk Downs Phase 1 Design

COMPUTED BY: EAE

DATE: 11/16/17

CHECKED BY: Eae

DATE: 11/17/17



# BEALS + THOMAS

## Standard 3: Drawdown

$$\text{Drawdown Time} = \frac{R_v}{(K) (\text{Bottom Area})}$$

where:

$R_v$  = Storage Volume Below Outlet [Ac-ft]

$K$  = Infiltration Rate [in/hr]

Bottom Area = Bottom Area of Recharge System [Ac]

### Infiltration Basin 1

$R_v$  = 0.194 Ac-ft

$K$  = 0.520 in/hr

Bottom Area = 0.064 Acres

**Drawdown Time = 69.590 Hours** < 72 Hours, Design is in compliance with the standard.

### Infiltration Basin 2

$R_v$  = 0.242 Ac-ft

$K$  = 0.170 in/hr

Bottom Area = 0.333 Acres

**Drawdown Time = 51.318 Hours** < 72 Hours, Design is in compliance with the standard.

#### Note:

1. The infiltration BMPs have been designed to fully drain within 72 hours, therefore the proposed stormwater management design is in compliance with Standard 3 .

2. Infiltration Rate based on Volume 3, Chapter 1, Table 2.3.3 *Rawls Rates* from the 2008 MA DEP Stormwater Management Handbook.

JOB NO. 2854.03

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CHECKED BY: E. Clark

JOB: Suffolk Downs Phase 1 Design

DATE: 11/16/17

DATE: 11/17/17



# BEALS + THOMAS

## Standard 4: Water Quality Volume Summary

$$V_{WQ} = (D_{WQ} / 12 \text{ in/ft}) \times (A_{IMP} \times 43,560 \text{ SF/Ac}) \text{ where:}$$

$V_{WQ}$  = Required Water Quality Volume [CF]

$D_{WQ}$  = Water Quality Depth : 1-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near critical areas, runoff from LUHPPL, or exfiltration to soil with infiltration rate 2.4 in/hr or greater; ½-inch for discharges to other areas.

$A_{IMP}$  = Post-development New Impervious Area; may exclude roof top areas [Ac]

### Required Water Quality Volume:

Drainage Area/ Treatment Train	$A_{IMP}$ [Ac]	$D_{WQ}$ [in]	$V_{WQ}$ Required [CF]	
PDA-2B	1.327	1	4,817	
PDA-3C	3.392	1	12,313	
PDA-5A	0.290	1	1,054	
<b>Total Required Water Quality Volume:</b>			<u>1,054</u>	Cubic Feet

### Provided Water Quality Volume:

Drainage Area/ Treatment Train	BMP	Water Quality Volume Provided [CF]	
PDA-2B	Infiltration Basin 1	8,434	
PDA-3C	Infiltration Basin 2	10,542	
PDA-5A	Water Quality inlet	1,054	
<b>Total Provided Water Quality Volume:</b>		<u>20,030</u>	Cubic Feet

**WATER QUALITY VOLUME PROVIDED IS GREATER THAN OR EQUAL TO THE REQUIRED WATER QUALITY VOLUME,  
THEREFORE PROPOSED STORMWATER MANAGEMENT DESIGN IS IN COMPLIANCE WITH STANDARD 4.**

JOB NO. 2854.03

COMPUTED BY: EAE

CHECKED BY: E. Calk

JOB: Suffolk Downs Phase 1 Design

DATE: 11/16/17

DATE: 11/17/17



**Stage-Area-Storage for Pond 4P: BASIN-01**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
14.50	2,800	0	17.10	5,530	10,547
14.55	2,840	141	17.15	5,595	10,825
14.60	2,880	284	17.20	5,660	11,106
14.65	2,920	429	17.25	5,725	11,391
14.70	2,960	576	17.30	5,790	11,679
14.75	3,000	725	17.35	5,855	11,970
14.80	3,040	876	17.40	5,920	12,264
14.85	3,080	1,029	17.45	5,985	12,562
14.90	3,120	1,184	17.50	6,050	12,863
14.95	3,160	1,341	17.55	6,115	13,167
15.00	3,200	1,500	17.60	6,180	13,474
15.05	3,250	1,661	17.65	6,245	13,785
15.10	3,300	1,825	17.70	6,310	14,098
15.15	3,350	1,991	17.75	6,375	14,416
15.20	3,400	2,160	17.80	6,440	14,736
15.25	3,450	2,331	17.85	6,505	15,060
15.30	3,500	2,505	17.90	6,570	15,386
15.35	3,550	2,681	17.95	6,635	15,717
15.40	3,600	2,860	18.00	6,700	16,050
15.45	3,650	3,041			
15.50	3,700	3,225			
15.55	3,750	3,411			
15.60	3,800	3,600			
15.65	3,850	3,791			
15.70	3,900	3,985			
15.75	3,950	4,181			
15.80	4,000	4,380			
15.85	4,050	4,581			
15.90	4,100	4,785			
15.95	4,150	4,991			
16.00	4,200	5,200			
16.05	4,260	5,412			
16.10	4,320	5,626			
16.15	4,380	5,843			
16.20	4,440	6,064			
16.25	4,500	6,288			
16.30	4,560	6,514			
16.35	4,620	6,744			
16.40	4,680	6,976			
16.45	4,740	7,211			
16.50	4,800	7,450			
16.55	4,860	7,692			
16.60	4,920	7,936			
16.65	4,980	8,183			
→ 16.70	5,040	8,434			
16.75	5,100	8,688			
16.80	5,160	8,944			
16.85	5,220	9,204			
16.90	5,280	9,466			
16.95	5,340	9,731			
17.00	5,400	10,000			
17.05	5,465	10,272			

**285400HC006**

Prepared by Beals and Thomas

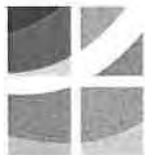
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Type III 24-hr BWSC-100yr Rainfall=8.78"

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**Stage-Area-Storage for Pond 2P: BASIN-02**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
16.00	14,500	0	18.65	18,805	44,064
16.05	14,580	727	18.70	18,890	45,006
16.10	14,660	1,458	18.75	18,975	45,953
16.15	14,740	2,193	18.80	19,060	46,904
16.20	14,820	2,932	18.85	19,145	47,859
16.25	14,900	3,675	18.90	19,230	48,818
16.30	14,980	4,422	18.95	19,315	49,782
16.35	15,060	5,173	19.00	19,400	50,750
16.40	15,140	5,928	19.05	19,485	51,722
16.45	15,220	6,687	19.10	19,570	52,699
16.50	15,300	7,450	19.15	19,655	53,679
16.55	15,380	8,217	19.20	19,740	54,664
16.60	15,460	8,988	19.25	19,825	55,653
16.65	15,540	9,763	19.30	19,910	56,647
16.70	15,620	10,542	19.35	19,995	57,644
16.75	15,700	11,325	19.40	20,080	58,646
16.80	15,780	12,112	19.45	20,165	59,652
16.85	15,860	12,903	19.50	20,250	60,663
16.90	15,940	13,698	19.55	20,335	61,677
16.95	16,020	14,497	19.60	20,420	62,696
17.00	16,100	15,300	19.65	20,505	63,719
17.05	16,180	16,107	19.70	20,590	64,746
17.10	16,260	16,918	19.75	20,675	65,778
17.15	16,340	17,733	19.80	20,760	66,814
17.20	16,420	18,552	19.85	20,845	67,854
17.25	16,500	19,375	19.90	20,930	68,898
17.30	16,580	20,202	19.95	21,015	69,947
17.35	16,660	21,033	20.00	<b>21,100</b>	<b>71,000</b>
17.40	16,740	21,868			
17.45	16,820	22,707			
17.50	16,900	23,550			
17.55	16,980	24,397			
17.60	17,060	25,248			
17.65	17,140	26,103			
17.70	17,220	26,962			
17.75	17,300	27,825			
17.80	17,380	28,692			
17.85	17,460	29,563			
17.90	17,540	30,438			
17.95	17,620	31,317			
18.00	17,700	32,200			
18.05	17,785	33,087			
18.10	17,870	33,979			
18.15	17,955	34,874			
18.20	18,040	35,774			
18.25	18,125	36,678			
18.30	18,210	37,587			
18.35	18,295	38,499			
18.40	18,380	39,416			
18.45	18,465	40,337			
18.50	18,550	41,263			
18.55	18,635	42,192			
18.60	18,720	43,126			



# BEALS + THOMAS

## TSS Removal

Location: Infiltration Basin 1

### TSS Removal Calculation Worksheet

A BMP <sup>1</sup>	B TSS Removal Rate <sup>1</sup>	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	0.25	1.00	0.25	0.75
Water Quality Inlet	0.44	0.75	0.33	0.42
Infiltration Basin	0.55	0.42	0.23	0.19

**Total TSS Removal =**

**58%**

44% Pretreatment Provided Prior to Infiltration

JOB NO. 2854.02  
JOB: Phase 1

COMPUTED BY: EAE  
DATE: 11/15/17

CHECKED BY: Eae  
DATE: 11/15/17



# BEALS + THOMAS

## TSS Removal

Location: Infiltration Basin 2

### TSS Removal Calculation Worksheet

A BMP <sup>1</sup>	B TSS Removal Rate <sup>1</sup>	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	0.25	1.00	0.25	0.75
Water Quality Inlet	0.44	0.75	0.33	0.42
Infiltration Basin	0.55	0.42	0.23	0.19

Total TSS Removal =

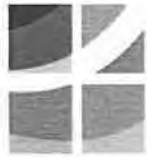
58%

44% Pretreatment Provided Prior to Infiltration

JOB NO. 2854.02  
JOB: Phase 1

COMPUTED BY: EAE  
DATE: 11/15/17

CHECKED BY: EAE  
DATE: 11/15/17



# BEALS + THOMAS

## TSS Removal

Location: WQI

### TSS Removal Calculation Worksheet

A BMP <sup>1</sup>	B TSS Removal Rate <sup>1</sup>	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	0.25	1.00	0.25	0.75
Water Quality Inlet	0.80	0.75	0.60	0.15

**Total TSS Removal =**

**85%**

44% Pretreatment Provided Prior to Infiltration

JOB NO. 2854.02  
JOB: Phase 1

COMPUTED BY: EAE  
DATE: 11/15/17

CHECKED BY: EAC  
DATE: 11/17/17

## **Appendix E**

### **Site Owner's Manual**

---

# Site Owner's Manual

## Suffolk Downs Redevelopment Phase 1

### **Boston, MA**

*Prepared for:*

**The McClellan Highway Development Company, LLC  
c/o The HYM Investment Group, LLC  
One Congress Street, 11th Floor  
Boston, Massachusetts, 02114**

*Presented by:*



**BEALS + THOMAS**

BEALS AND THOMAS, INC.  
Reservoir Corporate Center  
144 Turnpike Road  
Southborough, MA 01772-2104

**November 30, 2017**

## TABLE OF CONTENTS

<b>1.0 INTRODUCTION.....</b>	<b>1-1</b>
<b>2.0 SITE OWNER'S AGREEMENT.....</b>	<b>2-1</b>
2.1 OPERATION AND MAINTENANCE COMPLIANCE STATEMENT.....	2-1
2.2 STORMWATER MAINTENANCE EASEMENTS .....	2-1
2.3 RECORD KEEPING .....	2-1
2.4 TRAINING.....	2-2
<b>3.0 LONG-TERM POLLUTION PREVENTION PLAN.....</b>	<b>3-1</b>
3.1 STORAGE OF MATERIALS AND WASTE .....	3-1
3.2 VEHICLE WASHING .....	3-1
3.3 ROUTINE INSPECTIONS AND MAINTENANCE OF STORMWATER BMPs .....	3-1
3.4 SPILL PREVENTION AND RESPONSE.....	3-1
3.5 MAINTENANCE OF LAWNS, GARDENS, AND OTHER LANDSCAPED AREAS .....	3-1
3.6 STORAGE AND USE OF FERTILIZERS, HERBICIDES, AND PESTICIDES .....	3-2
3.7 PET WASTE MANAGEMENT .....	3-2
3.8 OPERATION AND MANAGEMENT OF SEPTIC SYSTEMS.....	3-2
3.9 SNOW AND DEICING CHEMICAL MANAGEMENT.....	3-2
3.10 NUTRIENT MANAGEMENT PLAN.....	3-2
<b>4.0 LONG-TERM OPERATION AND MAINTENANCE PLAN.....</b>	<b>4-1</b>
4.1 STORMWATER MANAGEMENT SYSTEM COMPONENTS .....	4-1
4.2 INSPECTION AND MAINTENANCE SCHEDULES .....	4-1
4.2.1 General Maintenance for Mosquito Control.....	4-1
4.2.2 Deep Sump and Hooded Catch Basins.....	4-1
4.2.3 Area Drains and Drop Inlets .....	4-2
4.2.4 Proprietary Separators .....	4-2
4.2.5 Infiltration Basins .....	4-2
4.2.6 Stormwater Outfalls.....	4-3
4.2.7 Street Sweeping.....	4-3

## FIGURES

FIGURE 1: SITE PLAN

## APPENDICES

APPENDIX A: OPERATION AND MAINTENANCE LOG

APPENDIX B: LIST OF EMERGENCY CONTACTS

APPENDIX C: PROPRIETARY SEPARATOR TECHNICAL MANUAL



## 1.0 INTRODUCTION

The Site Owner's Manual complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Handbook. The Manual outlines source control and pollution prevention measures and maintenance requirements of stormwater best management practices (BMPs) associated with the proposed development.



## **2.0 SITE OWNER'S AGREEMENT**

### **2.1 Operation and Maintenance Compliance Statement**

Site Owner: The McClellan Highway Development Company, LLC  
c/o The IIYM Investment Group, LLC  
One Congress Street, 11th Floor  
Boston, Massachusetts, 02114

Responsible Party: TBD

The McClellan Highway Development Company, LLC or their successors shall maintain ownership of the on-site stormwater management system as well as the responsibility for operation and maintenance during the post-development stages of the project. The site has been inspected for erosion and appropriate measures have been taken to permanently stabilize any eroded areas. All aspects of stormwater best management practices (BMPs) have been inspected for damage, wear and malfunction, and appropriate steps have been taken to repair or replace the system or portions of the system so that the stormwater at the site may be managed in accordance with the Stormwater Management Standards. Future responsible parties shall be notified of their continuing legal responsibility to operate and maintain the BMPs. The operation and maintenance plan for the stormwater BMPs is being implemented.

\_\_\_\_\_  
Responsible Party Signature

\_\_\_\_\_  
Date

### **2.2 Stormwater Maintenance Easements**

There are no off-site areas utilized for stormwater control, therefore no stormwater management easements are required. The Site Owner will have access to all stormwater practices for inspection and maintenance, including direct maintenance access by heavy equipment to structures requiring regular maintenance.

### **2.3 Record Keeping**

The Site Owner shall maintain a rolling log in which all inspections and maintenance activities for the past three years shall be recorded. The Operation and Maintenance Log includes information pertaining to inspections, repairs, and disposal relevant to the Phase 1 Project's stormwater management system. The Log is located in Appendix A.

The Operation and Maintenance Log shall be made available to the Conservation Commission and the MassDEP upon request. The Conservation Commission and the MassDEP shall be allowed to enter and inspect the premises to evaluate and ensure that the responsible party complies with the maintenance requirements for each BMP.

## 2.4 Training

Employees involved in grounds maintenance and emergency response will be educated on the general concepts of stormwater management and groundwater protection. The Site Owner's Manual will be reviewed with the maintenance staff. The staff will be trained on the proper course of action for specific events expected to be incurred during routine maintenance or emergency situations.

### **3.0 LONG-TERM POLLUTION PREVENTION PLAN**

In compliance with Standard 4 of the 2008 MassDEP Stormwater Management Handbook, this section outlines source control and pollution prevention measures to be employed on-site after construction.

#### **3.1 Storage of Materials and Waste**

The Phase 1 Project Site shall be kept clear of trash and debris at all times.

#### **3.2 Vehicle Washing**

No commercial vehicle washing shall take place on site.

#### **3.3 Routine Inspections and Maintenance of Stormwater BMPs**

See Section 4.0 Long-Term Operation and Maintenance Plan, for routine inspection and maintenance requirements for all proposed stormwater BMPs.

#### **3.4 Spill Prevention and Response**

A contingency plan shall be implemented to address the spill or release of petroleum products and hazardous materials and will include the following measures:

1. Equipment necessary to quickly attend to inadvertent spills or leaks shall be stored on-site in a secure but accessible location. Such equipment shall include but not be limited to the following: safety goggles, chemically resistant gloves and overshoe boots, water and chemical fire extinguishers, sand and shovels, suitable absorbent materials, storage containers and first aid equipment (i.e. Indian Valley Industries, Inc. 55-gallon Spill Containment kit or approved equivalent).
2. Spills or leaks shall be treated properly according to material type, volume of spillage and location of spill. Mitigation shall include preventing further spillage, containing the spilled material in the smallest practical area, removing spilled material in a safe and environmentally-friendly manner, and remediation of any damage to the environment.
3. For large spills, MassDEP Hazardous Waste Incident Response Group shall be notified immediately at (617) 792-7653 and an emergency response contractor shall be consulted.

#### **3.5 Maintenance of Lawns, Gardens, and other Landscaped Areas**

Lawns, gardens, and other landscaped areas shall be maintained regularly by the site owner. Vegetated and landscaped BMPs will be maintained as outlined in Section 4.0.

### **3.6 Storage and Use of Fertilizers, Herbicides, and Pesticides**

All fertilizers, herbicides, and pesticides shall be stored in accordance with local, state, and federal regulations. The application rate and use of fertilizers, herbicides, and pesticides on the Phase 1 Project Site shall at no time exceed local, state, or federal specifications.

### **3.7 Pet Waste Management**

Pet owners shall be required to pick up after their animals and dispose of waste in the trash.

### **3.8 Operation and Management of Septic Systems**

The proposed development will be serviced by City sewer and there are no proposed septic systems.

### **3.9 Snow and Deicing Chemical Management**

Snow removal and use of deicing chemicals at the Phase 1 Project Site shall comply with the following requirements:

- Plowed snow shall be placed in the areas designated on the site plans and/or outside of wetland boundaries and stormwater best management practices. The following maintenance measures shall be undertaken at all snow disposal sites:
  - Debris shall be cleared from an area prior to using it for snow disposal.
  - Debris and accumulated sediments shall be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.
- Salt and other deicing chemicals shall be stored in accordance with Massachusetts General Law. Per Massachusetts General Laws, Chapter 85, Section 7A, salt and other de-icing chemicals will be stored at an indoor location.
- Sand piles shall be contained and stabilized to prevent the discharge of sand to wetlands or water bodies, and, where feasible, covered.
- Salt storage piles shall be located outside of the 100-year floodplain.
- The application of salt on the proposed parking areas and driveway shall at no time exceed state or local requirements.

### **3.10 Nutrient Management Plan**

A nutrient management plan is required if a Total Maximum Daily Load (TMDL) has been developed that indicates that use of fertilizers containing nutrients or other specific pollutants must be reduced. The Phase 1 Project is located within the Boston Harbor watershed, which has a draft TMDL issued for pathogen indicators (i.e. fecal coliform, E. coli, and enterococcus bacteria). Urban runoff, combined sewer overflows, sewer overflows and heavy industrial activity have impaired Boston Harbor. Through implementing stormwater treatment BMPs, and source control measures and pollution prevention measures outlined in this manual the Phase 1 Project will not have any further impact on Boston Harbor.

## 4.0 **LONG-TERM OPERATION AND MAINTENANCE PLAN**

This section outlines the stormwater best management practices (BMPs) associated with the proposed stormwater management system and identifies the long-term inspection and maintenance requirements for each BMP.

### 4.1 **Stormwater Management System Components**

The following table outlines the type and quantity of the BMPs and their general location. Please reference the site plan(s) provided in the Figures section for exact location. All basins are accessible for maintenance.

<b>BMP Type</b>	<b>Location</b>
Deep Hooded Sump Catch Basin	Throughout Paved Areas
Proprietary Separators	Near infiltration basins
Infiltration Basin	Adjacent to Cul-de-sac and Access Roadway

## 4.2 **Inspection and Maintenance Schedules**

### 4.2.1 **General Maintenance for Mosquito Control**

If necessary to minimize mosquito breeding, a licensed pesticide applicator shall apply larvicides, such as *Bacillus sphaericus* (Bs) to all catch basins, sumps, and water quality inlets. Larvicides shall be applied in compliance with all pesticide label requirements, and will be applied during or immediately after wet weather, unless the product used can withstand extended dry periods. Ensure all manhole covers, and inspection ports are secure to reduce the likelihood of mosquitoes laying eggs in standing water.

### 4.2.2 **Deep Sump and Hooded Catch Basins**

Catch basins shall be inspected four times per year, including after the foliage season. Other inspection and maintenance requirements include:

- Units shall be cleaned (organic material, sediment and hydrocarbons removed) four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.
  - Cleanout shall always occur after street sweeping.
- If any evidence of hydrocarbons is found during inspection, the material shall be immediately removed using absorbent pads or other suitable measures and disposed of legally.
- Remove other accumulated debris as necessary.

- Transport and disposal of accumulated sediment off-site shall be in accordance with applicable local, state and federal guidelines and regulations.

#### **4.2.3 Area Drains and Drop Inlets**

Area drains and drop inlets shall be inspected and/or cleaned at least once per year.

#### **4.2.4 Proprietary Separators**

Maintenance of proprietary separators shall be performed according to the recommendations set forth by the manufacturer (see Appendix C. Proprietary Separator Technical Manual for complete installation, operation and maintenance procedures). Inspection and maintenance procedures for proprietary devices are provided below:

- Units shall be inspected post-construction, prior to being put into service.
- Units shall be inspected not less than twice per year following installation and no less than once per year thereafter.
- Units shall be inspected immediately after any oil, fuel or chemical spill.
- All inspections shall include checking the oil level and sediment depth in the unit.
- Removal of sediments/oils shall occur per manufacturer recommendations.
- A licensed waste management company shall remove captured petroleum waste products from any oil, chemical or fuel spills and dispose.
- OSHA confined space entry protocols shall be followed if entry into the unit is required.

#### **4.2.5 Infiltration Basins**

Infiltration basins shall be inspected and maintained after major storm events (rainfall totals greater than 2.5 inches in 24 hours) during the first three months of operation and twice a year and when there are discharges through the outlet control structure thereafter. Additionally, all pretreatment BMPs shall be inspected in accordance with the minimal requirements specified for those practices and after all major storm events. Inspections shall include the following measures:

- During and after major storm events, the length of time standing water remains in the basin shall be recorded.
  - If the time is greater than 72 hours, thoroughly inspect the basin for signs of clogging.
  - A corrective action plan shall be developed by a qualified professional to restore infiltrative function. The Site Owner shall take immediate action to implement these corrective measures.

- Examine the outlet structure for evidence of clogging or outflow release velocities that are greater than the design velocity.
- Identify areas of sediment accumulation, differential settlement, cracking, and erosion within the basin.
- Inspect embankments for leakage and tree growth.
- Examine the health of the vegetation within the basin and on the embankments.

Corrective measures shall be taken immediately as warranted by the inspections. If any evidence of hydrocarbons is found during inspection, the material shall be immediately removed using absorbent pads or other suitable measures and legally disposed.

Preventative maintenance shall include the following activities:

- Mow the buffer area and basin bottom and side slopes, if vegetated.
- Remove trash, debris, and accumulated organic matter.
- Remove clippings after mowing.

#### **4.2.6 Stormwater Outfalls**

Flared end sections and associated riprap spillways shall be inspected at least once per year and after major storm events (rainfall totals greater than 2.5 inches in 24 hours) to ensure that the stability of the outlet area is maintained. The outfall area shall be kept clear of debris such as trash, branches, and sediment. Repairs shall be made immediately if riprap displacement or downstream channel scour is observed.

#### **4.2.7 Street Sweeping**

Street sweeping shall occur primarily in spring and fall, and always prior to catch basin cleanout. Once removed from paved surfaces, the sweepings shall be handled and disposed of properly, and in compliance with applicable local, state and federal guidelines and regulations.



## Figures

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Figure 1: Site Plan

## **Appendices**

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## **Appendix A**

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### Operation and Maintenance Log

This template is intended to comply with the operation and maintenance log requirements of the 2008 MassDEP Stormwater Management Handbook. Copies of this log should be made for all inspections and kept on file for three years from the inspection date.

<b>Name/Company of Inspector:</b>
<b>Date/Time of Inspection:</b>
<b>Weather Conditions:</b> (Note current weather and any recent precipitation events)

[illegible]

## **Appendix B**

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### List of Emergency Contacts

## **List of Emergency Contacts**

- Massachusetts DEP Hazardous Waste Incident Response Group  
(617) 792-7653
- The McClellan Highway Development Company, LLC  
c/o The HYM Investment Group, LLC  
One Congress Street, 11th Floor  
Boston, Massachusetts, 02114  
(617) 248-8905
- Boston Fire Department Engine 56 Ladder 21  
1 Ashley Street  
Boston, MA 02128  
(617) 343-3550
- Boston Police District A-7  
69 Paris Street  
Boston, MA 02128  
(617) 343-4220
- Boston Water Sewer Commission  
980 Harrison Ave.  
Boston, MA 02119  
(617) 989-7000



## **Appendix C**

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### Proprietary Separator Technical Manual

**Appendix F**  
**Stormwater Pollution Prevention Plan**

---



# **EPA Construction General Permit**

## **SUFFOLK DOWNS REDEVELOPMENT PHASE 1**

**Boston, MA**

*Prepared for:*

**The McClellan Highway Development Company, LLC  
c/o The HYM Investment Group, LLC  
One Congress Street, 11<sup>th</sup> Floor  
Boston, Massachusetts, 02114**

*Presented by:*



**BEALS + THOMAS**

**Beals and Thomas, Inc.  
Reservoir Corporate Center  
144 Turnpike Road (Route 9)  
Southborough, MA 01772-2104**

**November 30, 2017**

## TABLE OF CONTENTS

<b>1.0</b>	<b>CONTACT INFORMATION/RESPONSIBLE PARTIES .....</b>	<b>1</b>
1.1	OPERATOR(S)/ SUBCONTRACTORS .....	1
1.2	STORMWATER TEAM.....	2
<b>2.0</b>	<b>SITE EVALUATION, ASSESSMENT AND PLANNING.....</b>	<b>4</b>
2.1	PROJECT/SITE INFORMATION .....	4
2.1.1	<i>Emergency-Related Projects.....</i>	<i>5</i>
2.2	NATURE AND SEQUENCE OF CONSTRUCTION ACTIVITY .....	5
2.2.1	<i>Function of the Construction Activity.....</i>	<i>5</i>
2.2.2	<i>Building Demolition.....</i>	<i>5</i>
2.2.3	<i>Agricultural Land.....</i>	<i>5</i>
2.2.4	<i>Estimated Project Dates .....</i>	<i>5</i>
2.3	SOILS, SLOPES, VEGETATION, AND CURRENT DRAINAGE PATTERNS .....	7
2.4	CONSTRUCTION SITE ESTIMATES .....	8
2.5	DISCHARGE INFORMATION.....	8
2.5.1	<i>Description of Receiving Storm Sewer Systems.....</i>	<i>8</i>
2.5.2	<i>Receiving Waters .....</i>	<i>9</i>
2.5.3	<i>Impaired Waters/ TMDLs .....</i>	<i>9</i>
2.5.4	<i>Tier 2, 2.5, or 3 Waters .....</i>	<i>9</i>
2.6	UNIQUE SITE FEATURES AND SENSITIVE AREAS .....	9
2.7	CONSTRUCTION SUPPORT ACTIVITIES.....	10
2.8	POTENTIAL SOURCES OF POLLUTION .....	10
2.8.1	<i>Potential Sources of Sediment .....</i>	<i>10</i>
2.8.2	<i>Potential Sources of Non-Sediment Pollutants .....</i>	<i>10</i>
2.9	SITE PLANS .....	12
<b>3.0</b>	<b>COMPLIANCE WITH APPLICABLE FEDERAL &amp; STATE REQUIREMENTS</b>	<b>13</b>
3.1	ENDANGERED SPECIES CERTIFICATION.....	13
3.2	HISTORIC PRESERVATION .....	13
3.3	SAFE DRINKING WATER ACT UNDERGROUND INJECTION CONTROL REQUIREMENTS ...	14
3.4	APPLICABLE STATE OR LOCAL PROGRAMS .....	15
<b>4.0</b>	<b>EROSION AND SEDIMENT CONTROL BMPS.....</b>	<b>16</b>
4.1	NATURAL BUFFERS OR EQUIVALENT SEDIMENT CONTROLS.....	16
4.2	MINIMIZE DISTURBED AREA AND PROTECT NATURAL FEATURES AND SOIL .....	17
4.2.1	<i>Preserve Existing Vegetation.....</i>	<i>17</i>
4.2.2	<i>Stockpiling Topsoil.....</i>	<i>18</i>
4.3	PHASED CONSTRUCTION ACTIVITY.....	18
4.4	CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT.....	19
4.4.1	<i>Grass Drainage Channels.....</i>	<i>19</i>
4.5	STABILIZE SOIL.....	19

4.5.1	Temporary Stabilization.....	19
4.5.2	Mulching.....	20
4.5.3	Permanent Stabilization.....	20
4.5.4	Dust Control.....	20
4.6	PROTECT SLOPES .....	21
4.6.1	Erosion Control Blanket .....	21
4.7	PROTECT STORM DRAIN INLETS .....	21
4.7.1	Filter Bags .....	21
4.8	ESTABLISH PERIMETER CONTROLS AND SEDIMENT BARRIERS .....	22
4.8.1	Erosion Control Barrier .....	22
4.8.2	Silt Fence .....	22
4.9	PREVENT SOIL COMPACTION .....	23
4.9.1	Protect Proposed Infiltration Areas.....	23
4.10	RETAIN SEDIMENT ON-SITE .....	23
4.10.1	Temporary Sediment Basins .....	23
4.11	ESTABLISH STABILIZED CONSTRUCTION ENTRANCE/EXIT.....	24
4.12	DEWATERING PRACTICES .....	25
<b>5.0</b>	<b>GOOD HOUSEKEEPING BMPS.....</b>	<b>25</b>
5.1	MATERIAL HANDLING AND WASTE MANAGEMENT.....	27
5.1.1	Solid or Construction Waste Disposal.....	27
5.1.2	Recycling.....	27
5.1.3	Sanitary and Septic Waste .....	28
5.1.4	Hazardous Materials and Waste.....	28
5.2	ESTABLISH PROPER BUILDING MATERIAL STAGING AREAS .....	29
5.4	DESIGNATE WASHOUT AREAS.....	30
5.4.1	Concrete Washout.....	30
5.4.2	Applicators, Containers and Paint Washout .....	31
5.5	ESTABLISH PROPER EQUIPMENT/VEHICLE FUELING AND MAINTENANCE PRACTICES ...	31
5.6	ALLOWABLE NON-STORMWATER DISCHARGES AND CONTROL EQUIPMENT / VEHICLE WASHING.....	32
5.7	SPILL PREVENTION AND CONTROL PROCEDURES.....	32
5.8	FERTILIZER DISCHARGE RESTRICTIONS .....	33
5.9	ALLOWABLE NON-STORMWATER DISCHARGE MANAGEMENT .....	33
<b>6.0</b>	<b>POST-CONSTRUCTION BMPS .....</b>	<b>35</b>
6.1	INFILTRATION BASIN .....	35
6.2	DEEP SUMP AND HOODED CATCH BASINS AND WATER QUALITY STRUCTURES.....	35
<b>7.0</b>	<b>FINAL STABILIZATION .....</b>	<b>36</b>
7.1	PERMANENT SEEDING .....	36
<b>8.0</b>	<b>INSPECTIONS AND MAINTENANCE.....</b>	<b>38</b>
8.1	INSPECTIONS .....	38

8.1.1	Inspection Schedule and Procedures .....	38
8.2	REDUCTIONS IN INSPECTION FREQUENCY .....	39
8.3	CORRECTIVE ACTION LOG .....	39
<b>9.0</b>	<b>RECORDKEEPING AND TRAINING.....</b>	<b>40</b>
9.1	RECORDKEEPING.....	40
9.2	LOG OF CHANGES TO THE SWPPP .....	40
9.3	TRAINING.....	40
9.3.1	Individual(s) Responsible for Training.....	40
9.3.2	Description of Training Conducted .....	41
<b>10.0</b>	<b>CERTIFICATION AND NOTIFICATION .....</b>	<b>42</b>
10.1	SIGNATURE, PLAN REVIEW, AND MAKING PLANS AVAILABLE .....	42
10.2	NOTICE OF PERMIT COVERAGE.....	42
10.3	OWNER CERTIFICATION .....	43
10.4	OPERATOR CERTIFICATION .....	44

## **LIST OF APPENDICES**

APPENDIX A:	GENERAL LOCATION MAP
APPENDIX B:	SITE PLANS
APPENDIX C:	CONSTRUCTION GENERAL PERMIT
APPENDIX D:	NOI AND ACKNOWLEDGEMENT LETTER FROM EPA
APPENDIX E:	INSPECTION REPORTS
APPENDIX F:	CORRECTIVE ACTION LOG
APPENDIX G:	SWPPP AMENDMENT LOG
APPENDIX H:	SUBCONTRACTOR CERTIFICATIONS/ AGREEMENTS
APPENDIX I:	GRADING AND STABILIZATION ACTIVITIES LOG
APPENDIX J:	TRAINING LOG
APPENDIX K:	DELEGATION OF AUTHORITY
APPENDIX L:	ENDANGARD SPECIES DOCUMENTATION
APPENDIX M:	HISTORIC PRESERVATION DOCUMENTATION
APPENDIX N:	TEMPORARY SEDIMENT BASIN SIZING CALCULATION
APPENDIX O:	NATURAL BUFFER EQUIVALENCY CALCULATIONS

## 1.0 CONTACT INFORMATION/RESPONSIBLE PARTIES

### 1.1 OPERATOR(S)/ SUBCONTRACTORS

#### Operator(s)

Company:	The McClellan Highway Development Company, LLC c/o The HYM Investment Group, LLC				
Name:					
Address:	One Congress Street, 11 <sup>th</sup> Floor				
City:	Boston	State:	MA	02114	
Telephone:		Email:			

Company:	TBD				
Name:					
Address:					
City:		State:		ZIP Code:	
Telephone:		Email:			

#### Subcontractor(s)

Company:	TBD				
Name:					
Address:					
City:		State:		ZIP Code:	
Telephone:		Email:			
Area of Control:	Site Work Contractor				

#### 24-Hour Emergency Contact

Company:	TBD
Name:	
Telephone:	

## 1.2 STORMWATER TEAM

### SWPPP Preparer

Company:	Beals and Thomas, Inc.				
Name:	Elizabeth Ennis, PE				
Address:	144 Turnpike Road				
City:	Southborough	State:	MA	ZIP Code:	01772
Telephone:	508-366-0560	Email:	eennis@bealsandthomas.com		

### Personnel Responsible for Installation & Maintenance of Stormwater BMPs

Company:	TBD				
Name:					
Address:					
City:		State:		ZIP Code:	
Telephone:		Email:			

### Inspection Personnel

Company:	TBD				
Name:					
Address:					
City:		State:		ZIP Code:	
Telephone:		Email:			

**Personnel Responsible for Taking Corrective Actions**

Company:	TBD				
Name:					
Address:					
City:		State:		ZIP Code:	
Telephone:		Email:			



## 2.0 SITE EVALUATION, ASSESSMENT AND PLANNING

### 2.1 PROJECT/SITE INFORMATION

Project/Site Name:		Suffolk Downs Redevelopment			
Project Street/Location:		525 McClellan Highway			
City:	Boston and Revere	State:	MA	ZIP Code:	02128-1035
County or Similar Subdivision:		Suffolk			

Latitude:	N 42° 23' 39"	Longitude:	W 70° 59' 52"
Method for Determining Latitude/Longitude: <input type="checkbox"/> USGS Topographic Map (specify scale: _____) <input type="checkbox"/> EPA Website <input type="checkbox"/> GPS <input checked="" type="checkbox"/> Other (please specify): <u>Google Earth Pro</u>			
Horizontal Reference Datum: <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> NAD 27  <input checked="" type="checkbox"/> NAD 83         </div> <div> <input type="checkbox"/> WGS 84  <input type="checkbox"/> Unknown         </div> </div>			

Is the project located on Indian country lands, or located on a property of religious of cultural significance to an Indian tribe? ☐ Yes ☒ No

If yes, provide the name of the Indian tribe associated with the area of Indian country (including the name of Indian reservation if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property:

\_\_\_\_\_

Is this project considered a federal facility? ☐ Yes ☒ No

Are you applying for permit coverage as a "federal operator" as defined in Appendix A of the 2017 CGP? ☐ Yes ☒ No

NPDES project or permit tracking number: TBD

### 2.1.1 Emergency-Related Projects

Is this project in response to a public emergency? ☐ Yes ☒ No

If yes, document the cause of the public emergency (*e.g., natural disaster, extreme flooding conditions*), information substantiating its occurrence (*e.g., state disaster declaration*), and a description of the construction necessary to reestablish effective public services:

## 2.2 NATURE AND SEQUENCE OF CONSTRUCTION ACTIVITY

### 2.2.1 Function of the Construction Activity

The project entails the construction of a 500,000± SF commercial office building and associated roadways, utilities and stormwater.

Function of the construction activity:

- |  |  |
|--|--|
| <input type="checkbox"/> Single-Family Residential | <input checked="" type="checkbox"/> Commercial         |
| <input type="checkbox"/> Multi-Family Residential  | <input type="checkbox"/> Industrial                    |
| <input type="checkbox"/> Institutional             | <input type="checkbox"/> Highway or Road Construction  |
| <input type="checkbox"/> Utility                   | <input type="checkbox"/> Other (please specify): _____ |

### 2.2.2 Building Demolition

Will there be demolition of any structure built or renovated before January 1, 1980? ☐ Yes ☒ No

If yes, do any of the structures being demolished have at least 10,000 square feet of floor space? ☐ Yes ☐ No

### 2.2.3 Agricultural Land

Was the pre-development land used for agriculture? ☐ Yes ☒ No

### 2.2.4 Estimated Project Dates

Estimated Project Start Date: TBD

Estimated Project Completion Date: TBD

Estimated Timeline of Activity	Construction Activity and BMP Descriptions
TBD-TBD	<p><b><i>Before any site grading activities begin</i></b></p> <ol style="list-style-type: none"> <li>1. Stake Limit of Construction. Workers shall be informed that no construction activity is to occur beyond this limit at any time.</li> <li>2. Delineate the limit of the natural buffer to be maintained with flags, tape or other similar device.</li> <li>3. Clear vegetation as necessary within the limits of construction. A stockpile of wood chips from tree cutting shall be left on site for stabilization.</li> <li>4. Grub the areas where silt fence is required, removing stumps and roots as necessary. The existing ground surface shall be disturbed as little as possible prior to the start of construction.</li> <li>5. Install silt fence and straw bales as shown on the plans. An adequate stockpile of erosion control materials shall be on site at all times for emergency or routine replacement and shall include materials to repair silt fences, straw bales, or any other devices planned for use during construction.</li> <li>6. Install storm drain inlet protection.</li> <li>7. Construct stabilized construction exits.</li> <li>8. Construct staging and materials storage area.</li> <li>9. Install temporary sanitary facilities and dumpsters.</li> </ol>
TBD-TBD	<p><b><i>Site grading</i></b></p> <ol style="list-style-type: none"> <li>1. Begin site clearing and grubbing operations.</li> <li>2. Commence excavation of stormwater management basins to act as temporary sedimentation basins during construction.</li> <li>3. Commence construction of temporary drainage channels to direct runoff to sedimentation basin(s) during construction. Check dams shall be installed along the temporary drainage channels to reduce velocities and collect sediment.</li> <li>4. Begin overall site grading and topsoil stripping.</li> <li>5. Establish topsoil stockpile.</li> <li>6. Install silt fences around stockpile and cover stockpiles.</li> <li>7. Disturbed areas where construction will cease for more than 7 days shall be stabilized with erosion controls.</li> </ol>
TBD-TBD	<p><b><i>Infrastructure (utilities, parking lot, etc.)</i></b></p> <ol style="list-style-type: none"> <li>1. Construct temporary concrete washout area.</li> <li>2. Install utilities, storm drains, sanitary sewers, and water services.</li> <li>3. Install gutters, curbs, and prepare pavement subgrade.</li> </ol>

TBD-TBD	<b><i>Building Construction</i></b> <ol style="list-style-type: none"> <li>1. Begin construction of building foundation and structure.</li> <li>2. Parking lot paved, exterior building constructed.</li> <li>3. Remove temporary concrete washout area.</li> <li>4. Implement winter stabilization procedures.</li> </ol>
TBD-TBD	<b><i>Final stabilization and landscaping</i></b> <ol style="list-style-type: none"> <li>1. Finalize pavement activities.</li> <li>2. Convert temporary sediment basin(s) to (a) permanent basin.</li> <li>3. Remove all temporary control BMPs and stabilize any areas disturbed by their removal with erosion controls.</li> <li>4. Prepare final seeding and landscaping.</li> <li>5. Monitor stabilized areas until final stabilization is reached.</li> </ol>

### 2.3 SOILS, SLOPES, VEGETATION, AND CURRENT DRAINAGE PATTERNS

Soil type(s): The soils within the racetrack consist of Udorthents with wet substratum. These soils are located in areas that were previously tidal marshes, river floodplains, bays, harbors, and swamps. The fill consists of rubble, refuse, and mixed soil material, typically, sand, gravel, and channel dredgings. The parking area are listed as Urban land with wet substratum. These soils consist of developed areas within Udorthents, wet substratum. No hydrologic soil class is assigned to these soil types, but permeability is typically low.

Small areas of Newport silt loam line the southern boundary of the Phase 1 Project Site. This is a deep, well-drained soil with moderate permeability, and typically shallow groundwater. It is classified as hydrologic soil class B. The soils along the eastern boundary of the Phase 1 Project Site consist of Ipswich mucky peat, which is a very poorly drained, nearly level soil in tidal marshes. It is listed as hydrologic soil class A/D.

Test pits performed on the overall Project Site in 2012 by Haley and Aldrich, Inc., indicated consistent material generally throughout the Project Site, consisting of fill. The top 24-inches of soil are classified as either poorly graded sand or silty sand. Below 24-inches the soil is mostly unclassified fill, poorly graded sand, silty sand, or clayey sand. Groundwater was found on average 2 to 7-feet below existing grade.

Slopes: Within the vicinity of the racetrack, the topography of the Project Site is generally flat, ranging from elevations 12 feet to 20 feet Boston City Base (BCB). There is a high point near the Tomasello Road at approximate elevation 21 feet BCB. The Project Site slopes downhill from Tomasello Road to the northeast boundary of the Project Site. There is a second high point located within the racetrack infield at approximate elevation 20 feet BCB.

Drainage Patterns: Currently the stormwater within the Phase 1 Project Site disturbed area drains to two primary locations:

The area on the western side of the Phase 1 Project Site drains to an intermittent stream located along the eastern perimeter of the site and eventually discharges into Sales Creek. The area in the center of the Phase 1 Project Site drains to the infield pond and eventually discharges into Sales Creek.

A small area on the northeast side of the Phase 1 Project Site drains directly to Sales Creek. Sales Creek flows southeasterly through the Project Site, passing through twin 96-inch culverts under the racetrack to an open channel traversing the racetrack infield where it flows under the back straight via twin 96-inch drains and discharges to an open channel between the track and Bennington Street immediately east of the Property.

Vegetation: The infield of the track contains areas of lawn, singular trees, and several clusters of trees. Areas of reeds line Sales Creek. To the south of the property is an intermittent stream surrounded by brush vegetation.

## 2.4 CONSTRUCTION SITE ESTIMATES

Total property area:	161.252± acres
Total construction site area to be disturbed:	xx± acres
Maximum area to be disturbed at one time:	TBD acres
Percentage impervious area before construction:	xx%
Runoff coefficient before construction:	xx
Percentage impervious area after construction:	TBD %
Runoff coefficient after construction:	TBD

## 2.5 DISCHARGE INFORMATION

### 2.5.1 Description of Receiving Storm Sewer Systems

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? ☒ Yes ☐ No

Several agreements with the Commonwealth of Massachusetts are in place for the maintenance of the portion of Sales Creek located on the Project Site. The Department of

Conservation and Recreation (DCR) has an easement for the portion of Sales Creek that traverses the Project Site, and is responsible for its maintenance. DCR also owns and maintains the culverts within Sales Creek on the Project Site, as well as the Belle Isle tide gates and pump station. Discharges from the drainage structures associated with the above infrastructure are regulated under DCR's Municipal Separate Storm Sewer Systems (MS4) NPDES Permit MARO43001.

### 2.5.2 Receiving Waters

The stormwater runoff ultimately flows to Sales Creek which ultimately discharges to Boston Harbor.

### 2.5.3 Impaired Waters/ TMDLs

Has the surface water been listed as "impaired?" ☒ Yes ☐ No

If yes, list the pollutant(s) causing the impairment: Pathogens

Describe the method(s) used to determine whether or not your project site discharges to an impaired water:

Has a TMDL been completed? ☐ Yes ☒ No

If yes, list the title of the TMDL document: Draft Pathogen TMDL for the Boston Harbor Watershed (excluding the Neponset River sub-basin)

List the pollutant(s) for which there is a TMDL: Pathogens

### 2.5.4 Tier 2, 2.5, or 3 Waters

Is this surface water designated as a Tier 2, 2.5 or 3 water? ☐ Yes ☒ No

If yes specify which Tier the surface water is designated as:

☐ Tier 2 ☐ Tier 2.5 ☐ Tier 3

## 2.6 UNIQUE SITE FEATURES AND SENSITIVE AREAS

The Phase 1 Project Site contains an intermittent stream located along the southern property line. Sales Creek flows southeasterly through the overall Project Site passing through twin 96-inch culverts under the racetrack to an open channel traversing the racetrack infield where it flows under the back straight via twin 96-inch drains and discharges to an open channel between the track and Bennington Street immediately east of the Project Site.

The Massachusetts Surface Water Quality Standards (314 CMR 4.00) list both Sales Creek and the intermittent stream as Class SA Outstanding Resource Waters (ORW). These waters are designated as an excellent habitat for fish, other aquatic life, and wildlife and shall have an excellent aesthetic value.

Sales Creek ultimately discharges to Belle Isle Marsh, which consists of approximately 241-acres and is part of the larger Rumney Marsh Area of Critical Environmental Concern (ACEC). Belle Isle Marsh is designated as a shellfish growing area by the Division of Marine Fisheries but is currently listed as an area where shellfish growing is prohibited

Both ORWs and shellfish growing areas are classified as critical areas.

## **2.7 CONSTRUCTION SUPPORT ACTIVITIES**

Construction support activities are not required for the Phase 1 Project.

## **2.8 POTENTIAL SOURCES OF POLLUTION**

### **2.8.1 Potential Sources of Sediment**

- Clearing and grubbing operations
- Grading and site excavation operations
- Vehicle tracking
- Topsoil stripping and stockpiling
- Landscaping operations

### **2.8.2 Potential Sources of Non-Sediment Pollutants**

- Combined Staging Area — small fueling activities, minor equipment maintenance, sanitary facilities, and hazardous waste storage.
- Materials Storage Area — general building materials, solvents, adhesives, paving materials, paints, aggregates, trash, and so on.
- Construction Activity — paving, curb/gutter installation, concrete pouring/mortar/stucco, and building construction
- Concrete Washout Area



<b>Material/ Chemical</b>	<b>Physical Description</b>	<b>Stormwater Pollutants</b>	<b>Location<sup>[1]</sup></b>
Pesticides	Various colored to colorless liquid, powder, pellets, or grains	Chlorinated hydrocarbons, organophosphates, carbamates, arsenic	Herbicides used for noxious weed control
<sup>[2]</sup> Fertilizer	Liquid or solid grains	Nitrogen, phosphorous	Newly seeded areas
Cleaning solvents	Colorless, blue, or yellow-green liquid	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates	No equipment cleaning allowed in project limits
Asphalt	Black solid	Oil, petroleum distillates	Streets, parking areas, and roofing
Glue/adhesives	White or yellow liquid	Polymers, epoxies	Building construction
Paints	Various colored liquids	Metal oxides, stoddard solvent, talc, calcium carbonate, arsenic	Building construction
Curing compounds	Creamy white liquid	Naphtha	Curb and gutter, walkways
Wood preservatives	Clear amber or dark brown liquid	Stoddard solvent, petroleum distillates, arsenic, copper, chromium	Timber pads and building construction
Hydraulic oil/fluids	Brown oily petroleum hydrocarbon	Mineral oil	Leaks or broken hoses from equipment
Gasoline	Colorless, pale brown or pink petroleum hydrocarbon	Benzene, ethyl benzene, toluene, xylene, MTBE	Secondary containment/staging area
Diesel Fuel	Clear, blue-green to yellow liquid	Petroleum distillate, oil & grease, naphthalene, xylenes	Secondary containment/staging area
Kerosene	Pale yellow liquid petroleum hydrocarbon	Coal oil, petroleum distillates	Secondary containment/staging area
Antifreeze/coolant	Clear green/yellow liquid	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)	Leaks or broken hoses from equipment
Sanitary toilets	Various colored liquid	Bacteria, parasites, and viruses	Staging area

[1] Area where material/chemical is used on-site.

[2] Use of fertilizers containing nitrogen and/ or phosphorus in ratios greater than recommended by the manufacture must be documented.



## 2.9 SITE PLANS

The Topographic Plan shows the undeveloped site and its current features. The Site Plans show the developed site, or the major phases of development.

These Site Plans include:

- ☐ Delineation of construction phasing, if applicable
- ☒ Areas of soil disturbance and areas that will not be disturbed
- ☐ Direction(s) of stormwater flow and approximate slopes before and after major grading activities
- ☒ Natural features to be preserved
- ☒ Locations of major structural and non-structural BMPs identified in the SWPPP
- ☐ Location(s) of sediment, soil or other construction materials will be stockpiled
- ☐ Locations of stabilization measures
- ☐ Locations of off-site material, waste, borrow, or equipment storage areas
- ☒ Location of all waters of the U.S., including wetlands on or near the site. Indicate if water bodies are listed as impaired, or are identified as Tier 2, 2.5 or 3 waters.
- ☐ Boundary lines of any natural buffers,
- ☒ Locations where stormwater discharges or allowable non-stormwater to surface water(s)
- ☒ Locations of storm drain inlets and stormwater control measures on the site and in the immediate vicinity of the site
- ☐ Locations of all pollutant-generating activities
- ☐ Locations where polymers, flocculants, or other treatment chemicals will be used and stored
- ☐ Areas of federally-listed critical habitat for endangered or threatened species

See Appendix B: Site Plans

### 3.0 **COMPLIANCE WITH APPLICABLE FEDERAL & STATE REQUIREMENTS**

#### 3.1 **ENDANGERED SPECIES CERTIFICATION**

Are endangered or threatened species and critical habitats on or near the project area?

☒ Yes ☐ No

Describe how this determination was made:

According to Massachusetts Bureau of Geographic Information (MassGIS) information accessed on October 31, 2017, the Phase 1 Project Site is not located within Natural Heritage and Endangered Species Program (NHESP)-designated Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife. There are no mapped potential or certified vernal pools on the Phase 1 Project Site.

Additionally, the Property is not currently mapped as containing winter hibernacula or maternity roost trees associated with the Northern Long-eared Bat (*Myotis septentrionalis*). According to the Information for Planning and Conservation tool published by the U.S. Fish and Wildlife Service, three species of threatened or endangered birds may be affected by activities in the Project vicinity: Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), and Roseate Tern (*Sterna dougallii dougallii*).

If yes, describe the species and/or critical habitat:

See above

If yes, describe or refer to documentation that determines the likelihood of an impact on the identified species and/or habitat and the steps taken to address that impact.

TBD

#### 3.2 **HISTORIC PRESERVATION**

##### **Step 1**

Will stormwater controls that require subsurface earth disturbance be installed on the site?

☒ Yes ☐ No

##### **Step 2**

If you answered yes in Step 1, have prior surveys or evaluations conducted on the site already determined that historic properties do not exist, or that prior disturbances at the site have precluded the existence of historic properties?

☐ Yes ☐ No

### Step 3

If you answered no in Step 2, has it been determined that the installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties?

☐ Yes ☐ No

### Step 4

If you answered no in Step 3, did the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Office (THPO), or other tribal representative (whichever applies) respond within 15 calendar days to indicate whether the subsurface earth disturbances caused by the installation of stormwater controls affect historic properties?

☐ Yes ☐ No

If no, no further documentation is required. If yes, describe the nature of their response and include documentation in the Appendix:

- ☐ Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions.
- ☐ No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls.
- ☐ Other:

## 3.3 SAFE DRINKING WATER ACT UNDERGROUND INJECTION CONTROL REQUIREMENTS

Do you plan to install any of the following controls?

- ☐ Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)
- ☐ Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow
- ☐ Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

If yes, attach documentation of contact between you and the applicable state agency or EPA Regional Office responsible for implementing the requirements for underground

injection wells in the Safe Drinking Water Act and EPA's implementing regulations at 40 CFR Parts 144-147.

### 3.4 APPLICABLE STATE OR LOCAL PROGRAMS

This SWPPP complies with the requirements of Standard 8 of the Massachusetts Department of Environmental Protection Stormwater Handbook, which states:

*A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plans) shall be developed and implemented.*

#### 4.0 **EROSION AND SEDIMENT CONTROL BMPS**

This SWPPP contains a listing of the erosion and sediment control best management practices (BMPs) that will be implemented to control pollutants in stormwater discharges. The BMPs are categorized under one of the areas of BMP activity as described below:

- Natural Buffers or Equivalent Sediment Controls
- Minimize disturbed area and protect natural features and soil
- Phased construction activity
- Control stormwater flowing onto and through the project
- Stabilize soils
- Protect slopes
- Protect storm drain inlets
- Establish perimeter controls and sediment barriers
- Retain sediment on-site and control dewatering practices
- Establish stabilized construction exits

#### 4.1 **NATURAL BUFFERS OR EQUIVALENT SEDIMENT CONTROLS**

Are there any surface waters located within 50 feet of your construction disturbances that receive stormwater discharges from the site? ☒ Yes ☐ No

If yes, check the compliance alternative that applies:

- ☐ A 50-foot undisturbed natural buffer will be maintained. The 50-foot buffer is shown on the attached site plans and will be clearly marked off with flags, tape, or a similar marking device prior to the commencement of earth disturbing activities.
- ☒ An undisturbed natural buffer of x-feet will be provided along with supplemental erosion and sediment controls, which in combination achieves the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. The estimated sediment removal calculations are included in the appendixes of this report and have been calculated using the applicable tables included in Appendix G of the 2017 Construction General Permit or site-specific calculations were performed to estimate the sediment removal of a 50-buffer zone and the efficiency of the reduced buffer zone and supplemental erosion control measures.

**Description of Controls:**

Provide a description of the additional erosion and sediment controls proposed, including the model or other tool used to estimate the sediment load reductions and the results from the calculation.

- ☐ It is infeasible to provide and maintain an undisturbed natural buffer of any size, therefore erosion and sediment controls will be implemented that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. The estimated sediment removal calculations are included in the appendixes of this report and have been calculated using the applicable tables included in Appendix G of the 2017 Construction General Permit or site-specific calculations were performed to estimate the sediment removal of a 50-buffer zone and the efficiency of the reduced buffer zone and supplemental erosion control measures.
- ☐ The project qualifies for one of the exceptions in Part 2.1.2.1.e. of the 2012 Construction General Permit. Specifically:
  - ☐ There is no discharge of stormwater to surface waters through the area between the disturbed portions of the site and any surface waters located within 50 feet of the site. This includes situations where control measures have been implemented such as a berm or other barrier that will prevent such discharges.
  - ☐ No natural buffer exists due to preexisting development disturbances, such as impervious surfaces or structures that were constructed prior to the initiation of planning for this project.
  - ☐ For a “linear project,” site constraints (e.g., limited right-of-way) make it infeasible for the site to meet any of the CGP Part 2.1.2.1.a compliance alternatives
  - ☐ The project qualifies as “small residential lot” construction, and complies with:

## 4.2 MINIMIZE DISTURBED AREA AND PROTECT NATURAL FEATURES AND SOIL

### 4.2.1 Preserve Existing Vegetation

Description:	The preserved area of existing vegetation shall be as identified on the Site Plans and Sitework Specifications.
Installation Schedule:	The preserved area of existing vegetation shall be surrounded with the orange-colored plastic mesh fence, and trees shall be marked before construction begins at the site.
Maintenance and Inspection:	The area shall be inspected weekly to ensure the temporary fence is intact and the trees are clearly marked. During construction, preserved areas of existing vegetation shall be surrounded by the orange-colored mesh fence and clearly marked at all times.

#### 4.2.2 Stockpiling Topsoil

Description:	Topsoil stripped from the immediate construction area shall be stockpiled as identified on the Site Plans and Sitework Specifications or as approved by the SWPPP preparer. Stockpiles shall be located outside of any natural buffers and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated.
Installation Schedule:	Topsoil stockpiles shall be established during grading activities. The silt fence and temporary erosion controls shall be installed immediately after the stockpile has been established. For piles that will be unused for 7 or more days provide cover over the stockpile or temporary stabilization to avoid direct contact with precipitation and wind. Install a sediment barrier along all downgradient perimeter areas of stockpiles.
Maintenance and Inspection:	The area shall be inspected weekly for erosion and immediately after storm events. Areas on or around the stockpile that have eroded shall be stabilized immediately with erosion controls. See following Silt Fence section for Maintenance and inspection procedures.

#### 4.3 PHASED CONSTRUCTION ACTIVITY

The proposed Phase 1 Project is the first phase of the Master Plan for the redevelopment of Suffolk Downs. To minimize erosion during grading activities, grading and site work shall be conducted during periods of predicted dry weather. The areas of the Phase 1 Project Site that will remain vegetated after construction shall be graded first and stabilized with hydromulch or seeding immediately after grading activities are completed. All other areas of the construction site shall be stabilized if site work is not planned for more than 7 days. To minimize potential erosion from the Phase 1 Project Site, only areas necessary to construct the grass drainage channels, sediment basin, and construction entrances/exits shall be disturbed initially. These areas shall be cleared, grubbed, and graded and the above measures shall be installed. These areas shall be stabilized immediately after construction but no later than 7 days after construction ceases. Overall grubbing, clearing, grading shall be conducted over a 2-week period to limit erosion from the Phase 1 Project Site. Areas graded during this time period shall be stabilized with hydromulch immediately after construction but no later than 7 days after construction ceases.

## 4.4 CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT

### 4.4.1 Grass Drainage Channels

Description:	A grass drainage channel shall be installed as indicated on the site plans. The channel shall convey runoff to storm drain inlets and temporary sediment basins, as appropriate or at locations shown on plans. Some grass drainage channels shall remain as a permanent stormwater structure after construction is complete.
Installation Schedule:	The grass drainage channel shall be installed after clearing and grubbing operations are completed at the site.
Maintenance and Inspection:	The channel shall be inspected weekly and immediately after storm events for erosion and structural failures. Before vegetation has been established in the channel, inspect erosion control blankets, embankments, and beds for erosion and accumulation of debris and sediment. Remove debris, sediment, and repair erosion control blankets, fiber rolls and embankments immediately.

#### Design Specifications

1. The channel shall have a positive drainage to convey runoff to the storm drain inlets and temporary sediment basins.

## 4.5 STABILIZE SOIL

### 4.5.1 Temporary Stabilization

Description:	Initiation of temporary vegetative cover shall occur immediately where construction will cease for more than 7 days. It shall be established using hydroseeding for areas of exposed soil (including stockpiles).
Installation Schedule:	Temporary stabilization measures shall be initiated immediately where construction activities will temporarily cease for more than 7 days.
Maintenance and Inspection:	Stabilized areas shall be inspected weekly and after storm events until a dense cover of vegetation has become established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately.



#### 4.5.2 Mulching

Description:	Hydromulching shall provide immediate protection to exposed soils during short periods of disturbance. Hydromulch shall also be applied in areas that have been seeded for temporary or permanent stabilization.
Installation Schedule:	Hydromulch shall be applied to exposed soils during short periods of construction and seeded areas.
Maintenance and Inspection:	Mulched areas shall be inspected weekly and after storm events to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, the surface shall be repaired, and new mulch shall be applied to the damaged area.

#### 4.5.3 Permanent Stabilization

Description:	Initiation of permanent stabilization measures shall occur immediately after the final design grades are achieved and earth moving activities cease. Native species of plants shall be used to establish vegetative cover on exposed soils. Permanent stabilization shall be completed in accordance with the procedures outlined in the Final Stabilization section of this report.
Installation Schedule:	Portions of the Phase 1 Project Site where construction activities have permanently ceased shall be stabilized, as soon as possible.
Maintenance and Inspection:	All seeded areas shall be inspected weekly during construction activities and after storm events until a dense cover of vegetation has been established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately. Care shall be taken to avoid compacting newly placed topsoil. After construction is completed at the Phase 1 Project Site, permanently stabilized areas shall be monitored until final stabilization is reached.

#### 4.5.4 Dust Control

Description:	Dust from the Phase 1 Project Site shall be controlled by using a mobile pressure-type distributor truck to apply water to disturbed areas. The mobile unit shall apply water at a rate of 300 gallons per acre and minimized as necessary to prevent runoff and ponding.
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Installation Schedule:	Dust control shall be implemented as needed once site grading has been initiated and during windy conditions (forecasted or actual wind conditions of 20 mph or greater) while site grading is occurring. Spraying of water shall be performed no more than three times a day during the months of May–September and once per day during the months of October–April or whenever the dryness of the soil warrants it.
Maintenance and Inspection:	At least one mobile unit shall be available at all times to distribute water to control dust on the Phase 1 Project Site. Each mobile unit shall be equipped with a positive shutoff valve to prevent over watering of the disturbed area.

## 4.6 PROTECT SLOPES

### 4.6.1 Erosion Control Blanket

Description:	Erosion control blankets shall be used to provide stabilization for the slopes in the grass drainage channels and sediment basins, and on slopes greater than 3:1 throughout the Phase 1 Project Site.
Installation Schedule:	The erosion control blankets shall be installed once the slopes of the grass drainage channel and sediment basin have reached final grade.
Maintenance and Inspection:	The erosion control blanket shall be inspected weekly and immediately after storm events to determine if cracks, tears, or breaches have formed in the fabric; if so, the blanket shall be repaired or replaced immediately. Good contact with the soil shall be maintained and erosion shall not occur under the blanket. Any areas where the blanket is not in close contact with the ground shall be repaired or replaced.

## 4.7 PROTECT STORM DRAIN INLETS

### 4.7.1 Filter Bags

☐ Permanent ☒ Temporary

Description:	Filter bag manufactured specifically for controlling sediment flow into all storm drain inlets to prevent coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.
Installation Schedule:	Filter bags shall be installed prior to clearing and grubbing.
Maintenance and Inspection:	Storm drain inlet protection shall be inspected weekly and following storms. Clogged filter bags shall be cleaned or replaced. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, you must remove the deposited sediment by the end of the same work day it is found or by the following work day if removal the same day is not feasible. Collected sediments shall NOT be washed into storm drains.

## 4.8 ESTABLISH PERIMETER CONTROLS AND SEDIMENT BARRIERS

### 4.8.1 Erosion Control Barrier

☐ Permanent ☒ Temporary

Description:	An erosion control barrier, consisting of entrenched straw bales, straw wattles, compost socks and siltation fencing, shall be installed along the downgradient side of the proposed Phase 1 Project to decrease the velocity of sheet flows and intercept and detain small amounts of sediment from disturbed areas.
Installation Schedule:	Erosion control barrier shall be installed prior to clearing and grubbing.
Maintenance and Inspection:	Erosion control barrier shall be inspected weekly, following storms, and daily during rainy periods. Damaged fencing shall be replaced. Concentrated flows shall be intercepted and rerouted. Sediment accumulations shall be removed when reaching a depth of 6-inches, or one-half of the above ground height of the barrier, whichever is less. Deteriorated fencing material shall be replaced. Used fencing shall be properly disposed of.

### 4.8.2 Silt Fence

☐ Permanent ☒ Temporary

Description:	Entrenched silt fence shall be installed to decrease the
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	velocity of sheet flows and intercept and detain small amounts of sediment from disturbed areas.
Installation Schedule:	Silt fence shall be installed prior to clearing and grubbing.
Maintenance and Inspection:	Silt fence shall be inspected weekly, following storms, and daily during rainy periods. Damaged fencing shall be replaced. Concentrated flows shall be intercepted and rerouted. Sediment accumulations shall be removed when reaching a depth of 6-inches. Deteriorated fencing material shall be replaced. Used fencing shall be properly disposed of.

## 4.9 PREVENT SOIL COMPACTION

### 4.9.1 Protect Proposed Infiltration Areas

<input type="checkbox"/> Permanent	<input checked="" type="checkbox"/> Temporary
Description:	An erosion control barrier, consisting of entrenched straw bales and siltation fencing, shall be installed around the perimeter of all proposed infiltration areas to prevent construction vehicles from impacting the area, to decrease the velocity of sheet flows and intercept, and detain small amounts of sediment from disturbed areas.
Installation Schedule:	The erosion control barrier shall be installed after clearing and grubbing.
Maintenance and Inspection:	Silt fence shall be inspected weekly, following storms, and daily during rainy periods. Damaged fencing shall be replaced. Concentrated flows shall be intercepted and rerouted. Sediment accumulations shall be removed when reaching a depth of 6-inches. Deteriorated fencing material shall be replaced. Used fencing shall be properly disposed of.

## 4.10 RETAIN SEDIMENT ON-SITE

### 4.10.1 Temporary Sediment Basins

☐ Permanent ☒ Temporary

Description:	Temporary sediment basins are located throughout the Phase 1 Project Site between construction and wetland resource areas. These basins provide 3,600 cubic feet of storage per acre drained, as required by the EPA. Refer to the Temporary Sediment Basin Sizing Calculation located in Appendix N. Several temporary sediment basins will be utilized as sediment forebays following construction.
Installation Schedule:	Temporary sediment basins shall be installed during grading activities.
Maintenance and Inspection:	Temporary sediment basins shall be inspected weekly and following storms. Sediment shall be removed when it reaches a depth of one foot, or half the design capacity whichever is less. Damage to basin embankments and slopes shall be repaired.

#### 4.11 ESTABLISH STABILIZED CONSTRUCTION ENTRANCE/EXIT

☐ Permanent      ☒ Temporary

Description:	Temporary gravel or crushed stone construction entrances/exits or other means shall be used to minimize off-site movement of soil with vehicles. Construction access points shall be maintained to minimize tracking of soil onto public roads and existing parking lots to remain. If the rock entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected.
Installation Schedule:	Stabilized construction entrance shall be installed prior to clearing and grubbing.
Maintenance and Inspection:	Stabilized construction entrances shall be inspected daily. Gravel or crushed stone shall be added if the pad is no longer in accordance with the specifications. If the rock entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected. When sediment has been tracked off of the site, it shall be removed by the end of the same working day, or by the end of the next working day if track-out occurs on a non work day. Remove sediment by sweeping, shoveling or vacuuming roadways where sediment has been tracked-out.

#### 4.12 DEWATERING PRACTICES

Description:	<p>All groundwater or stormwater discharged from excavations, trenches, foundations, vaults, or other similar point shall be treated by sediment basins, sediment traps, sediment socks, dewatering tanks, tube settlers or filtration systems specifically designed to remove sediment from the excavations. All dewatering practices shall conform to the following:</p> <ul style="list-style-type: none"> <li>• Visible floating solids or foam shall not be discharged;</li> <li>• An oil-water separator or suitable filtration device (such as a cartridge filter) that is designed to remove oil, grease, or other products if dewatering water is found to contain these materials shall be used;</li> <li>• To the extent feasible, utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge. In no case will surface waters be considered part of the treatment area;</li> <li>• Velocity dissipaters shall be installed at all points where dewatering activities are discharged to the surface.</li> <li>• With backwash water, either haul it away for disposal or return it to the beginning of the treatment process; and</li> <li>• Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.</li> </ul>
Installation Schedule:	Install settling or filtration methods prior to commencing dewatering. Engineer is required to approve settling or filtration method design prior to installation.
Maintenance and Inspection:	Settling or filtration controls shall be inspected weekly and following storms. Sediment shall be removed when it reaches a depth of one foot, or half the design capacity whichever is less.

#### 5.0 GOOD HOUSEKEEPING BMPs

This SWPPP contains a listing of the good housekeeping best management practices (BMPs) that shall be implemented to control pollutants in stormwater discharges during construction-related work. The BMPs are categorized below:

- Material Handling and Waste Management
- Establish Proper Building Material Staging Areas
- Designate Washout Areas
- Establish Proper Equipment/Vehicle Fueling and Maintenance Practices
- Allowable Non-Stormwater Discharges and Control Equipment/Vehicle Washing
- Spill Prevention and Control Plan

## 5.1 MATERIAL HANDLING AND WASTE MANAGEMENT

Several management procedures and practices are proposed to prevent and/or reduce the discharge of pollutants to stormwater from solid or liquid wastes that will be generated at the Phase 1 Project Site. These measures are grouped into the following categories: (1) solid or construction waste disposal, (2) recycling, (3) sanitary and septic waste, and (4) hazardous materials.

### 5.1.1 Solid or Construction Waste Disposal

Description:	All waste materials shall be collected and disposed of into metal trash dumpsters in the materials storage area. Dumpsters shall have a secure watertight lid, be placed away from stormwater conveyances and drains, and meet all federal, state, and municipal regulations. Only trash and construction debris from the Phase 1 Project Site shall be deposited in the dumpster. No construction materials shall be buried on-site unless authorized by a program for recycling/beneficial use. All personnel shall be instructed regarding the correct disposal of trash and construction debris. Notices that state these practices shall be posted in the office trailer and the individual who manages day-to-day operations on the Phase 1 Project Site shall be responsible for seeing that these practices are followed.
Installation Schedule:	Trash dumpsters shall be installed once the materials storage area has been established.
Maintenance and Inspection:	The dumpsters shall be inspected weekly and immediately after storm events. The dumpsters shall be emptied weekly and taken to an approved landfill or recycling facility. If trash and construction debris are exceeding the dumpsters' capacity, the dumpsters shall be emptied more frequently. Waste container lids shall be closed when not in use and at the end of the business day. For waste containers that do not have lids, provide cover or a similarly effective means to minimize the discharge of pollutants.

### 5.1.2 Recycling

Description:	Wood pallets, cardboard boxes, and other recyclable construction scraps shall be disposed of in a designated dumpster for recycling. The dumpster shall have a secure watertight lid, be placed away from stormwater conveyances and drains and meet all local and state solid-waste management regulations. Only solid recyclable construction scraps from the Phase 1 Project Site shall be deposited in the dumpster. All personnel shall be instructed
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	regarding the correct procedure for disposal of recyclable construction scraps. Notices that state these procedures shall be posted in the office trailer, and the individual who manages day-to-day operations on the Phase 1 Project Site shall be responsible for seeing that these procedures are followed.
Installation Schedule:	Designated recycling dumpsters shall be installed once the area has been established.
Maintenance and Inspection:	The recycling dumpster shall be inspected weekly and immediately after storm events. The recycling dumpster shall be emptied weekly and taken to an approved recycling center. If recyclable construction wastes are exceeding the dumpsters' capacity, the dumpsters shall be emptied more frequently.

### 5.1.3 Sanitary and Septic Waste

Description:	Temporary sanitary facilities (portable toilets) shall be provided at the Phase 1 Project Site throughout the construction phase. The portable toilets shall be located in the staging area, away from concentrated flow paths and traffic flow.
Installation Schedule:	The portable toilets shall be brought to the Phase 1 Project Site once the staging area has been established.
Maintenance and Inspection:	All sanitary waste shall be collected from the portable facilities on a regular basis. The portable toilets shall be inspected weekly for evidence of leaking holding tanks. Toilets with leaking holding tanks shall be removed from the site and replaced with new portable toilets.

### 5.1.4 Hazardous Materials and Waste

Description:	All hazardous waste materials such as oil filters, petroleum products, paint, and equipment maintenance fluids shall be stored in structurally sound and sealed shipping containers, within the hazardous materials storage area. Hazardous waste materials shall be stored in appropriate and clearly marked containers and segregated from other non-waste materials. Secondary containment shall be provided for all waste materials in the hazardous materials storage area and shall consist of commercially available spill pallets. Additionally, all hazardous waste materials shall be disposed of in accordance with federal, state, and municipal regulations. Hazardous waste materials shall not be disposed of into the on-site dumpsters. All personnel shall be instructed regarding proper procedures for hazardous waste disposal. Notices that state these procedures shall be posted in the
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	office trailer and the individual who manages day-to-day operations on the Phase 1 Project Site shall be responsible for seeing that these procedures are followed.
Installation Schedule:	Shipping containers used to store hazardous waste materials shall be installed once the Phase 1 Project Site materials storage area has been installed.
Maintenance and Inspection:	The hazardous waste material storage areas shall be inspected weekly and after storm events. The storage areas shall be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Material safety data sheets, material inventory, and emergency contact numbers shall be maintained in the office trailer.

## 5.2 ESTABLISH PROPER BUILDING MATERIAL STAGING AREAS

Description:	<p>Construction equipment and maintenance materials shall be stored at the combined staging area and materials storage areas. A watertight shipping container shall be used to store hand tools, small parts, and other construction materials. Nonhazardous building materials such as packaging material (wood, plastic, and glass), and construction scrap material (brick, wood, steel, metal scraps, and pipe cuttings) shall be stored in a separate covered storage facility adjacent to the shipping container.</p> <p>All hazardous-waste materials such as oil filters, petroleum products, paint, and equipment maintenance fluids shall be stored in structurally sound and sealed containers under cover within the storage area.</p> <p>All fertilizers, herbicides, insecticides and pesticides shall be stored in accordance with local, state, and federal regulations. At a minimum these materials shall be covered with plastic sheeting or a temporary roof to prevent contact with rainwater.</p> <p>Very large items, such as framing materials and stockpiled lumber, shall be stored in the open in the materials storage area. Such materials shall be elevated on wood blocks to minimize contact with runoff.</p>
Installation Schedule:	The materials storage area shall be installed after grading and before any infrastructure is constructed at the Phase 1 Project Site.
Maintenance and Inspection:	The storage area shall be inspected weekly and after storm events. The storage area shall be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.

## 5.4 DESIGNATE WASHOUT AREAS

### 5.4.1 Concrete Washout

Description:	<p>A designated temporary, above-grade concrete washout area shall be constructed. The temporary concrete washout area shall be constructed with a recommended minimum length and minimum width of 10 feet, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The washout area shall be lined with plastic sheeting at least 10 mils thick and free of any holes or tears. Signs shall be posted marking the location of the washout area to ensure that concrete equipment operators use the proper facility.</p> <p>Concrete pours shall not be conducted during or before an anticipated storm event. Concrete mixer trucks and chutes shall be washed in the designated area or concrete wastes shall be properly disposed of off-site. When the temporary washout area is no longer needed for the construction project, the hardened concrete and materials used to construct the area shall be removed and disposed of according to the maintenance section below, and the area shall be stabilized.</p>
Installation Schedule:	The washout area shall be constructed before concrete pours occur at the Phase 1 Project Site.
Maintenance and Inspection:	<p>The washout areas shall be inspected daily to ensure that all concrete washing is being discharged into the washout area, no leaks or tears are present, and to identify when concrete wastes need to be removed. The washout areas shall be cleaned out once the area is filled to 75 percent of the holding capacity. Once the area's holding capacity has been reached, the concrete wastes shall be allowed to harden; the concrete shall be broken up, removed, and taken to an approved landfill for disposal or recycled on-site or off-site in accordance with applicable laws. The plastic sheeting shall be replaced if tears occur during removal of concrete wastes from the washout area.</p>

#### Design Specifications:

1. Temporary concrete washout type Above Grade shall be constructed as shown above, with a recommended minimum length and minimum width of 10 feet.
2. The washout shall be a minimum of 50 feet from storm drain inlets.
3. Plastic lining shall be free of holes, tears, or other defects that compromise the impermeability of the material.

#### 5.4.2 Applicators, Containers and Paint Washout

Description:	A designated temporary, above-grade washout area shall be constructed as needed for the washout and cleanout of stucco, paint, or other non-hazardous construction materials. The temporary washout area shall be a leak-proof container with sufficient volume to contain all liquid and waste generated by washout operations. The temporary washout shall be sited outside of all buffer zones.
Installation Schedule:	The washout area shall be constructed as needed.
Maintenance and Inspection:	The washout areas shall be inspected daily to ensure that all washing is being discharged into the washout area, no leaks or tears are present, and to identify when wastes need to be removed. The washout areas shall be cleaned out once the area is filled to 75 percent of the holding capacity. Liquid wastes shall be disposed of in accordance with applicable Federal and State requirements and shall not be discharged into drainage systems.

#### 5.5 ESTABLISH PROPER EQUIPMENT/VEHICLE FUELING AND MAINTENANCE PRACTICES

Description:	Several types of vehicles and equipment will likely be used on-site throughout the Phase 1 Project, including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes, and forklifts. All major equipment/vehicle fueling and maintenance shall be performed outside of wetland buffer zones. When vehicle fueling must occur on-site, the fueling activity shall occur in the staging area. Only minor equipment maintenance shall occur on-site. All equipment fluids generated from maintenance activities shall be disposed of into designated drums stored on spill pallets in accordance with the Material Handling and Waste Management Section. Absorbent, spill-cleanup materials and spill kits shall be available at the combined staging and materials storage area. Drip pans shall be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.
Installation Schedule:	BMPs implemented for equipment and vehicle maintenance and fueling activities shall begin at the start of the Phase 1 Project.
Maintenance and Inspection:	Inspect equipment/vehicle storage areas weekly and after storm events. Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately, using dry cleanup measures where possible and eliminating the source of the discharge. Problem vehicle(s) or equipment

shall be removed from the Phase 1 Project Site. Keep ample supply of spill-cleanup materials on-site and immediately clean up spills and dispose of materials properly. Do not clean surfaces by hosing-down the area

## 5.6 ALLOWABLE NON-STORMWATER DISCHARGES AND CONTROL EQUIPMENT / VEHICLE WASHING

Description:	All equipment and vehicle washing shall be performed off-site, except as required for wheel washes and concrete washout areas.
Installation Schedule:	N/A
Maintenance and Inspection:	N/A

## 5.7 SPILL PREVENTION AND CONTROL PROCEDURES

Description:	<ul style="list-style-type: none"> <li>i. Employee Training: All employees shall be trained as detailed in the Inspection and Maintenance section of this report.</li> <li>ii. Vehicle Maintenance: Vehicles and equipment shall be maintained off-site. All vehicles and equipment including subcontractor vehicles shall be checked for leaking oil and fluids. Vehicles leaking fluids shall not be allowed on-site.</li> <li>iii. Hazardous Material Storage: Hazardous materials shall be stored in accordance with this report and federal and municipal regulations.</li> <li>iv. Spill Kits: Spill kits shall be kept within the materials storage area. Spills: All spills shall be cleaned up immediately upon discovery. Spent absorbent materials and rags shall be hauled off-site immediately after the spill is cleaned up for disposal at an approved landfill. Spills large enough to discharge to surface water or in exceedance of applicable Massachusetts Contingency Plan thresholds shall be reported to the National Response Center at 1-800-424-8802 and MassDEP at 617-792-7653.</li> <li>v. Material safety data sheets: A material inventory and emergency contact information shall be maintained at the on-site project trailer.</li> </ul>
Installation Schedule:	The spill prevention and control procedures shall be implemented once construction begins on-site.
Maintenance and Inspection:	All personnel shall be instructed the correct procedures for spill prevention and control. Notices that state these practices shall be posted in the office trailer, and the individual who manages day-to-day operations

on the Phase 1 Project Site shall be responsible for seeing that these procedures are followed.

## 5.8 FERTILIZER DISCHARGE RESTRICTIONS

Description:	Discharges from fertilizers containing nitrogen and phosphorus shall be minimized. Fertilizers shall be applied at rates and amounts consistent with the manufacture's specification, and shall at no time exceed local, state, or federal specifications. See project landscape specifications for acceptable fertilizers that can be used for the project.
Installation Schedule:	Fertilizers shall be applied at an appropriate time of year, timed to coincide as closely as possible to the period of maximum vegetation uptake and growth. Avoid applying fertilizers before heavy rains. Do not apply fertilizers to frozen ground or stormwater conveyance channels flowing with water.
Maintenance and Inspection:	N/A

## 5.9 ALLOWABLE NON-STORMWATER DISCHARGE MANAGEMENT

Any changes in construction activities that produce other allowable non-stormwater discharges shall be identified, and the SWPPP shall be amended and the appropriate erosion and sediment control shall be implemented.

The following is a list of allowable non-stormwater discharges:

- Water Used to Control Dust
- Uncontaminated Excavation Dewatering
- Landscape Irrigation
- Fire Hydrant Flushing
- Firefighting
- Potable Water including uncontaminated waterline flushing
- Building Wash-Down provided soaps, solvents and detergents are not used and the external surface does not contain hazardous substances (i.e. paint or caulk containing PCBs)
- Pavement Wash-Down provided spills or leaks of toxic substances have not occurred and where soaps, solvents and detergents are not used.
- Non-Detergent Laden Vehicle Wash Water
- Foundation or Footing Drains
- Uncontaminated air conditioning or compressor condensate

Except for water used to control dust and irrigation water, the above discharges shall not be routed to areas of exposed soil.



## 6.0 **POST-CONSTRUCTION BMPS**

### 6.1 **INFILTRATION BASIN**

Description:	Infiltration basins shall be protected from stormwater runoff from the disturbed site during construction. Riprap spillways shall be constructed as detailed on the site plan.
Design Specifications:	Install according to sitework specifications and details.
Installation Schedule:	Infiltration basins shall be excavated during earthwork construction.
Maintenance and Inspection:	The basins shall be inspected weekly and after storm events greater than 0.5 inches during construction. The area shall be checked for signs of erosion, seepage, and structural damage. Erosion, seepage, and structural damage shall be repaired immediately. The temporary sediment riser shall be checked for any damage or obstructions and any damage found shall be repaired and obstructions removed. Immediately after the completion of construction, the plant material shall be watered for 14 consecutive days unless there is sufficient natural rainfall. The area shall be monitored until final stabilization is reached. Following completion of site construction and final stabilization, maintenance and inspection responsibilities shall be taken over by the Owner in accordance with the Long-Term Pollution Prevention Plan and Long-Term Operation & Maintenance Plan.

### 6.2 **DEEP SUMP AND HOODED CATCH BASINS AND WATER QUALITY STRUCTURES**

Description:	Deep sump and hooded catch basins and water quality structures shall be located throughout paved areas on the Phase 1 Project Site. Catch basins and water quality structures shall collect, treat, and convey stormwater runoff from the proposed roadways.
Design Specifications:	Handle and install according to site work specifications. Filter bags shall be installed in all storm drain inlets.
Installation Schedule:	Catch basins and water quality structures shall be installed during utility construction.
Maintenance and Inspection:	Catch basins and water quality structures shall be inspected weekly and after major storm events during construction. See maintenance of Filter Bags for information on maintenance procedures. Following completion of Phase 1 Project Site construction and final stabilization, maintenance and inspection responsibilities shall be taken over by the Owner in accordance with the Long-Term Pollution Prevention Plan and Long-Term Operation & Maintenance Plan.



## 7.0 **FINAL STABILIZATION**

In compliance with the Construction General Permit, soil stabilization measures must be implemented immediately whenever earth-disturbing activities are temporarily or permanently ceased on any portion of the Phase 1 Project Site. Earth-disturbing activities are temporarily ceased when clearing, grading, and excavation within any area of a site that will not include a permanent structure will not resume for a period of 7 or more calendar days, but such activities will resume in the future.

In the context of this provision, “immediately” means as soon as practicable, but no later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased. The following activities constitute the initiation of stabilization:

- Preparing the soil for vegetative or non-vegetative stabilization;
- applying mulch or other non-vegetative product to the exposed area;
- seeding or planting the exposed area;
- starting any of the activities in listed above on a portion of the area to be stabilized, but not on the entire area; and
- finalizing arrangements to have stabilization product fully installed in compliance with the applicable deadline for completing stabilization.

As soon as practicable, but no later than 7 calendar days after the initiation of soil stabilization measures the following activities are required to be completed:

- For vegetative stabilization, all activities necessary to initially seed or plant the area to be stabilized; and/or
- For non-vegetative stabilization, the installation or application of all such non-vegetative measures.

The following sections detail the management practices proposed to achieve final stabilization of the site.

### 7.1 **PERMANENT SEEDING**

Description:	Permanent seeding shall be applied immediately after the final design grades are achieved on portions of the Phase 1 Project Site but no later than 7 days after construction activities have permanently ceased. After the entire Phase 1 Project Site is stabilized, any sediment that has accumulated shall be removed and hauled off-site for disposal at an approved landfill. Construction debris, trash and temporary BMPs (including silt fences, material storage areas, sanitary toilets, and inlet protection) shall also be removed and any areas disturbed during removal shall be seeded immediately. Seeding shall be performed in
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	accordance to the Site Plans and Landscape Specifications for the project.
Installation Schedule:	Seeding shall occur at portions of the site where construction activities have permanently ceased shall be stabilized, as soon as possible but no later than 14 days after construction ceases.
Maintenance and Inspection:	All seeded areas shall be inspected weekly during construction activities for failure and after storm events until a dense cover of vegetation has been established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately. After construction is completed at the site, permanently stabilized areas shall be monitored until final stabilization is reached.

## **8.0 INSPECTIONS AND MAINTENANCE**

### **8.1 INSPECTIONS**

#### **8.1.1 Inspection Schedule and Procedures**

Inspections of the Phase 1 Project Site will be performed once every 7 days and within 24 hours of the end of a storm event of 0.25-inch or greater unless otherwise specified. The inspections will verify that all BMPs required are implemented, maintained, and effectively minimizing erosion and preventing stormwater contamination from construction materials.

Inspections shall include all areas of the Phase 1 Project Site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation. Inspectors shall look for evidence of, or the potential for, pollutants entering the stormwater conveyance system. Sedimentation and erosion control measures identified in the SWPPP shall be observed to ensure proper operation. Discharge locations shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to waters of the United States, where accessible. Where discharge locations are inaccessible, nearby downstream locations shall be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the Phase 1 Project Site shall be inspected for evidence of off-site sediment tracking.

Utility line installation, pipeline construction, and other examples of long, narrow, linear construction activities may limit the access of inspection personnel to the areas described in the above paragraph. Inspection of these areas could require that vehicles compromise temporarily or even permanently stabilized areas, cause additional disturbance of soils, and increase the potential for erosion. In these circumstances, controls shall be inspected on the same frequencies as other construction projects, but representative inspections may be performed. For representative inspections, personnel shall inspect controls along the construction site for 0.25 mile above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described above. The conditions of the controls along each inspected 0.25 mile segment may be considered as representative of the condition of controls along that reach extending from the end of the 0.25 mile segment to either the end of the next 0.25 mile inspected segment, or to the end of the project, whichever occurs first.

For detailed inspection procedures, see Sections 4 and 5.

All inspections shall be coordinated with a representative from the IYM Investment Group, LLC. An IYM Investment Group, LLC representative shall accompany the inspector, when possible, during inspections.

Inspection reports are required to be completed within 24-hours of an inspection. If corrective actions are identified by the Inspector during the inspection, he or she shall notify and submit a copy of the inspection report to the Operator(s). For corrective actions identified, the project managers shall be responsible for initiating the corrective action within 24 hours of the report and completing maintenance as soon as possible or before the next storm event. For any corrective actions requiring a SWPPP amendment or change to a stormwater conveyance or control design, the project manager shall notify Owner, as soon as possible, before initiating the corrective action.

For a copy of the inspection report template, see Appendix E.

## **8.2 REDUCTIONS IN INSPECTION FREQUENCY**

Once an area is stabilized, inspections may be reduced to once per month. If construction resumes at the stabilized area the inspection frequency shall increase as outlined in section 8.1.

If earth-disturbing activities are suspended due to frozen conditions inspections can be temporarily suspended until a thaw occurs.

## **8.3 CORRECTIVE ACTION LOG**

The corrective action log describes repairs, replacements, and maintenance of BMPs undertaken as a result of the inspections and maintenance procedures. Additionally, remedies of permit violations and clean and proper disposal of spills, releases other deposits should be recorded.

If it is determined the stormwater controls have not been installed as required, or that they are not functioning adequately corrective action is required within 7 calendar days.

See Appendix F – Corrective Action Log.

## **9.0 RECORDKEEPING AND TRAINING**

### **9.1 RECORDKEEPING**

A copy of the SWPPP, along with all inspection reports and corrective action logs are required to be stored at an accessible location at the Phase 1 Project Site, and shall be made available upon request of the EPA, or state or local agency approving stormwater management plans.

The following records shall be kept at the Phase 1 Project Site and shall be available for inspectors to review. These records shall be retained for a minimum period of at least 3 years after the permit is terminated.

**Date(s) when major grading activities occur:**

See Appendix I – Grading and Stabilization Activities Log

**Date(s) when construction activities temporarily or permanently cease on a portion of the site:**

See Appendix I – Grading and Stabilization Activities Log

**Date(s) when an area is either temporarily or permanently stabilized:**

See Appendix I – Grading and Stabilization Activities Log

### **9.2 LOG OF CHANGES TO THE SWPPP**

The log of changes to the SWPPP is maintained in Appendix G and includes additions of new BMPs, replacement of failed BMPs, significant changes in the activities or their timing on the project, changes in personnel, changes in inspection and maintenance procedures and update to site plans.

### **9.3 TRAINING**

Prior to the commencement of earth-disturbing activities or pollutant-generating activities, whichever occurs first, training on the pollution prevention measures outlined in this SWPPP shall be provided to staff and subcontractors.

#### **9.3.1 Individual(s) Responsible for Training**

Company/Organization: TBD

Name: TBD

### 9.3.2 Description of Training Conducted

Informal training shall be conducted for all staff, including subcontractors, on the site. The training shall be conducted primarily via tailgate sessions and shall focus on avoiding damage to stormwater BMPs and preventing illicit discharges. The tailgate sessions shall be conducted biweekly and shall address the following topics: Erosion Control BMPs, Sediment Control BMPs, Non-Stormwater BMPs, Waste Management and Materials Storage BMPs, and Emergency Procedures specific to the construction site. (See Appendix J – Training Log)

Formal training shall be provided to all staff and subcontractors with specific stormwater responsibilities, such as installing and maintaining BMPs. The formal training shall cover all design and construction specifications for installing the BMPs and proper procedures for maintaining each BMP. Formal training shall occur before any BMPs are installed on the site. (See Appendix J – Training Log)

## **10.0 CERTIFICATION AND NOTIFICATION**

### **10.1 SIGNATURE, PLAN REVIEW, AND MAKING PLANS AVAILABLE**

A copy of the SWPPP (including a copy of the Construction General Permit, NOI, and acknowledgement letter from EPA shall be retained at the Phase 1 Project Site (or other location easily accessible during normal business hours to EPA, a state, tribal or local agency approving sediment and erosion plans, grading plans, or stormwater management plans; local government officials; the operator of a municipal separate storm sewer receiving discharges from the site; and representatives of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service) from the date of commencement of construction activities to the date of final stabilization. A copy of the SWPPP shall be available at a central location on-site for the use of all those identified as having responsibilities under the SWPPP. If an on-site location is unavailable to store the SWPPP when no personnel are present, notice of the plan's location shall be posted near the main entrance at the Phase 1 Project Site.

### **10.2 NOTICE OF PERMIT COVERAGE**

A sign must be posted at a safe, publicly accessible location in close proximity to the Phase 1 Project Site detailing the permit coverage. The notice must be located so that it is visible from the public road that is nearest to the active part of the Phase 1 Project Site, and it must use a font large enough to be readily viewed from a public right-of-way. At a minimum, the notice must include:

- The NPDES Permit Tracking Number,
- A contact name and phone number for obtaining additional construction site information,
- The Uniform Resource Locator (URL) for the SWPPP (if available), or the following statement: "If you would like to obtain a copy of the Stormwater Pollution Prevention Plan (SWPPP) for this site, contact the EPA Regional 1 Office at (617) 918-1038,
- The following statement "If you observe indicators of stormwater pollutants in the discharge or in the receiving waterbody, contact the EPA through the following website: <https://www.epa.gov/enforcement/report-environmental-violations>."

### 10.3 OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_



#### 10.4 OPERATOR CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## **APPENDICES**

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## **Appendix A**

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### General Location Map

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## Appendix B

### Site Plans

## **Appendix C**

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### Construction General Permit

[https://www.epa.gov/sites/production/files/2017-02/documents/2017\\_cgp\\_final\\_permit\\_508.pdf](https://www.epa.gov/sites/production/files/2017-02/documents/2017_cgp_final_permit_508.pdf)

## **Appendix D**

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### NOI and Acknowledgement Letter from EPA

## **Appendix E**

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### **Inspection Reports**

Inspections under this SWPPP shall be conducted in accordance with each installed BMPs recommended maintenance requirements. This inspection frequency may be reduced to at least once every month if: a) the entire site is temporarily stabilized, b) runoff is unlikely due to winter conditions (e.g. site is covered with snow, ice, or the ground is frozen), or c) construction is occurring during seasonal arid periods in arid areas and semi-arid areas. If an inspection report is filed according to this modified schedule it shall be noted at the end of the report under the "NOTES" section.

The following four pages should be copied and completed for each inspection. All inspection forms should be compiled in a binder to prove compliance with this SWPPP.

## Stormwater Pollution Prevention Plan: Inspection Checklist

General Information			
Project Name			
NPDES Tracking No.		Location	
Date of Inspection		Start/End Time	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
<b>Type of Inspection:</b> <input type="checkbox"/> Regular <input type="checkbox"/> Pre-storm event <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event			
Weather Information			
<b>Has there been a storm event since the last inspection?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <b>If yes, provide:</b> Storm Start Date & Time: _____ Storm Duration (hrs): _____  Approx. Amount of Precipitation (in): _____			
<b>Weather at time of this inspection?</b> <input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds <input type="checkbox"/> Other: _____ Temperature: _____			
<b>Have any discharges occurred since the last inspection?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <b>If yes, describe:</b> _____			
<b>Are there any discharges at the time of inspection?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <b>If yes, describe:</b> _____			



### Site-specific BMPs

- Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.
- Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.

BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

**Overall Site Issues**

*Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.*

<b>BMP/activity</b>	<b>Implemented?</b>	<b>Maintenance Required?</b>	<b>Corrective Action Needed and Notes</b>
Are all slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are discharge points and receiving waters free of any sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Is the construction exit preventing sediment from being tracked into the street?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

<b>BMP/activity</b>	<b>Implemented?</b>	<b>Maintenance Required?</b>	<b>Corrective Action Needed and Notes</b>
Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
(Other)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

#### **Non-Compliance**

Describe any incidents of non-compliance not described above:

#### **CERTIFICATION STATEMENT**

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

**Print name and title:**

\_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

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## **Appendix F**

### Corrective Action Log

## Corrective Action Log

*Use this form to note the date and activity for accurate record keeping (make additional copies as necessary). Examples include the restaking or reinforcement of the erosion control barrier, site watering to prevent dust erosion, street sweeping, equipment and machinery repair, etc.*

[illegible]

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## Appendix G

### SWPPP Amendment Log

The SWPPP, including the site plans, shall be amended whenever there is a change in design, construction, operation, or maintenance at the construction site that has or could have a significant effect on the discharge of pollutants to the waters of the United States that has not been previously addressed in the SWPPP.

The SWPPP shall be amended if during inspections or investigations by site staff, or by local, state, tribal or federal officials, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the construction site.

Based on the results of an inspection, the SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) calendar days following the inspection. Implementation of these additional or modified BMPs shall be accomplished as described in Subpart 3.6B of the Construction General Permit (located in Appendix C).

## SWPPP Amendment Log

[illegible]

## **Appendix H**

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### Subcontractor Certifications/Agreements



## Sample Subcontractor Certifications/Agreements

### SUBCONTRACTOR CERTIFICATION STORMWATER POLLUTION PREVENTION PLAN

Project Number: \_\_\_\_\_

Project Title: \_\_\_\_\_

Operator(s): \_\_\_\_\_

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

**I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.**

This certification is hereby signed in reference to the above named project:

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Type of construction service to be provided: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_



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## **Appendix I**

### **Grading and Stabilization Activities Log**

Site Plans in Appendix B should be annotated to indicate areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

*The following records are to be kept by each Site Operator throughout the construction period and maintained in the SWPPP. Insert additional documentation for record keeping as necessary.*

## Grading and Stabilization Activities Log

[illegible]

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## **Appendix J**

### Training Log

## Training Log

Date	Training Topic	Attendee	Signature of Training Coordinator